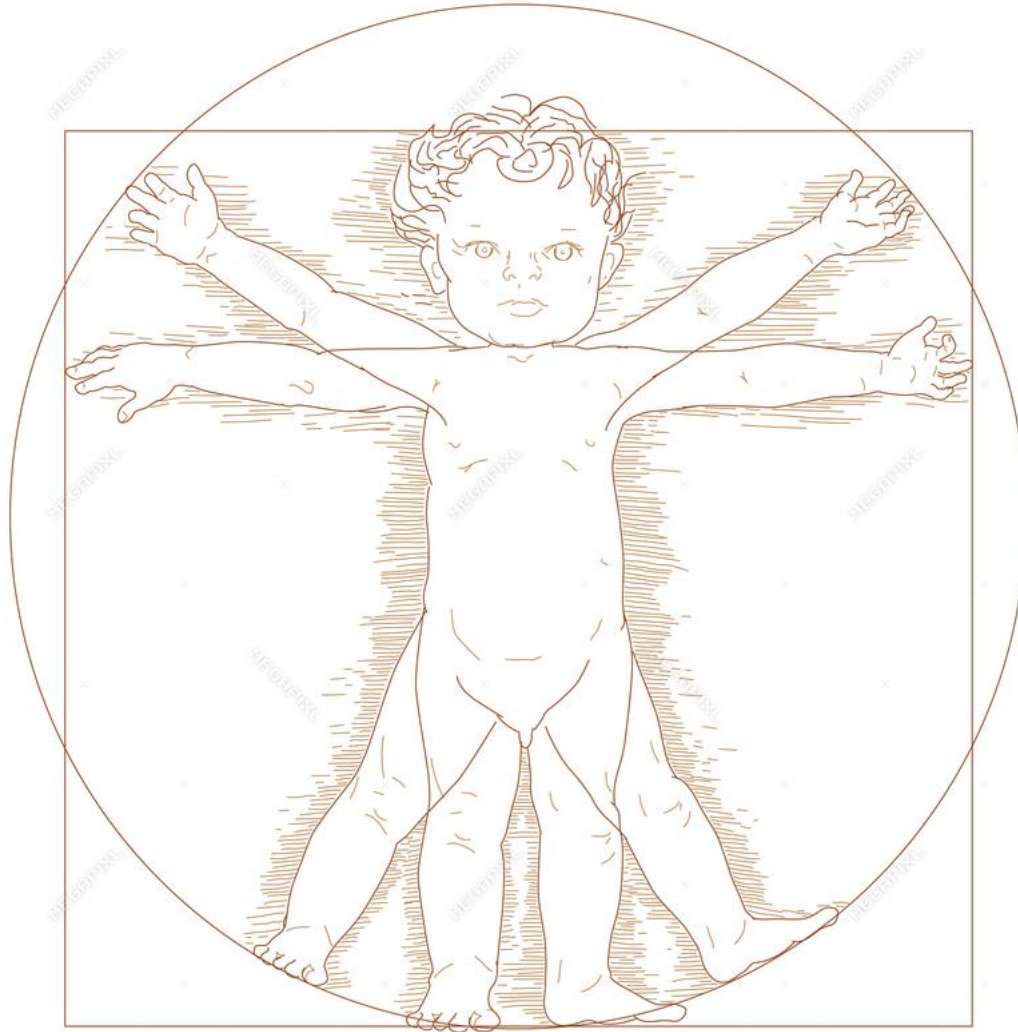
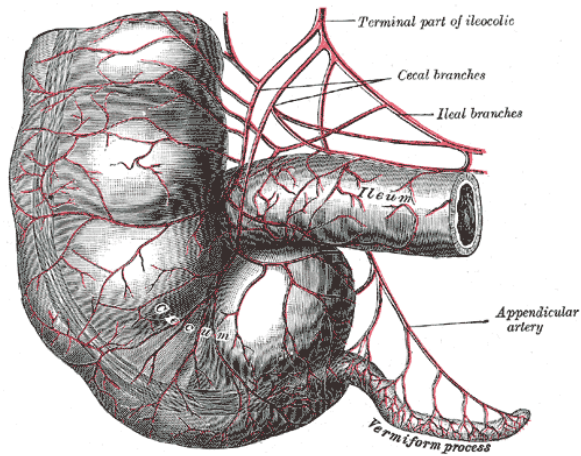
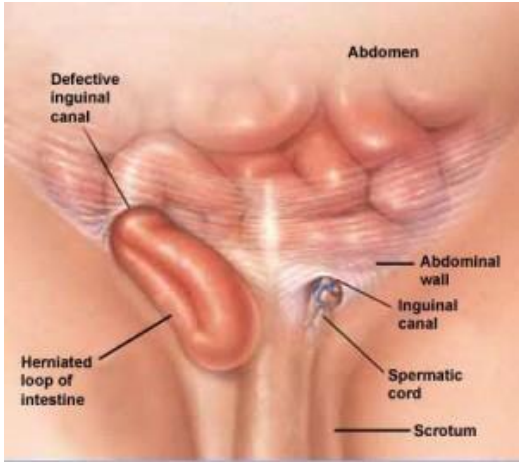


Wat is kinderchirurgie?



Wat is kinderchirurgie?

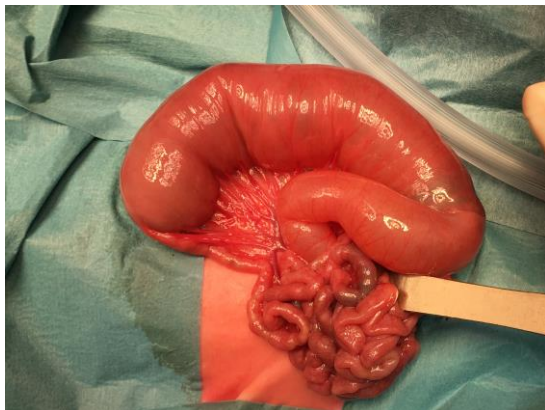
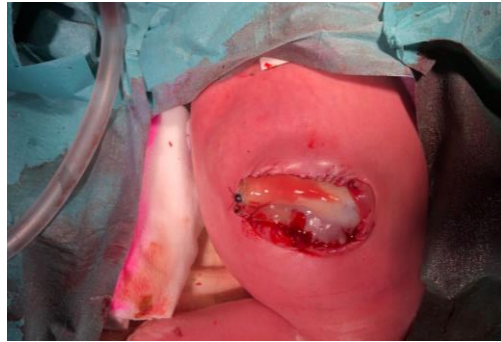
Algemene chirurgie (buikwandbreuk, blinde darmontsteking vasculaire toegang)

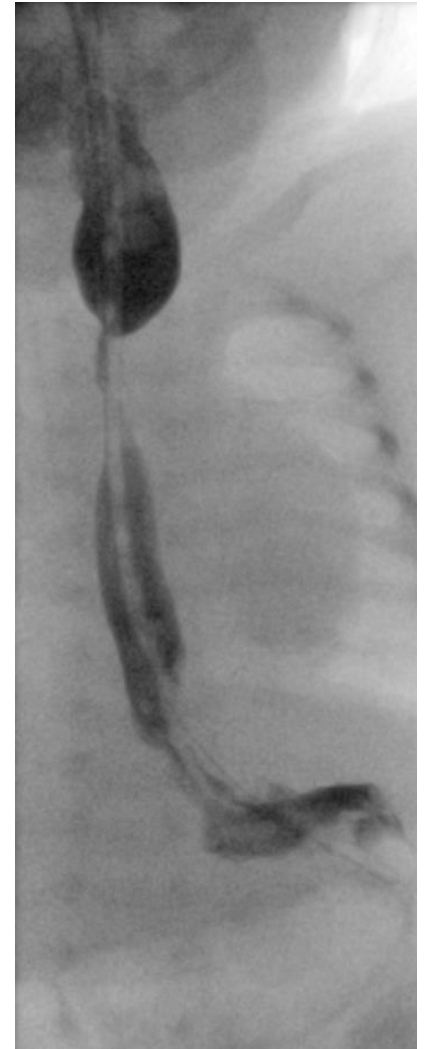
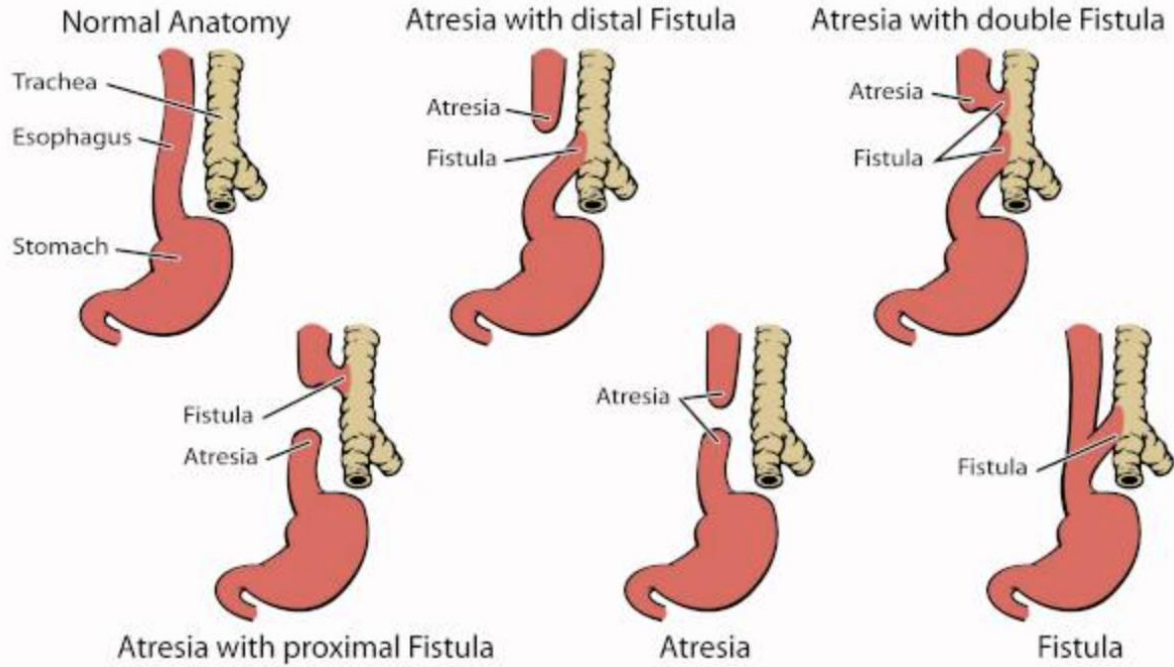


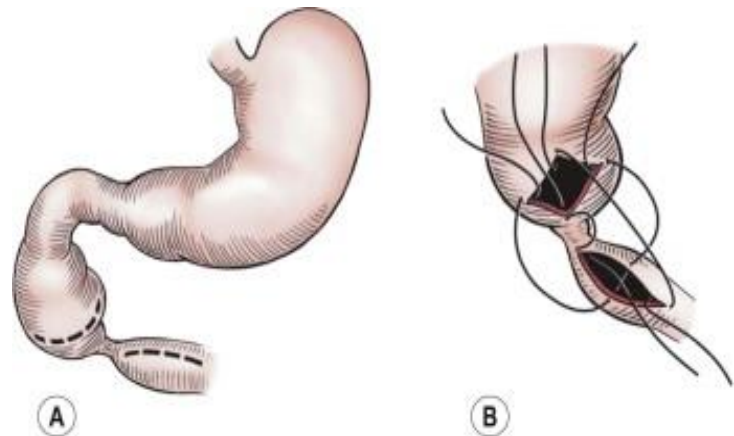
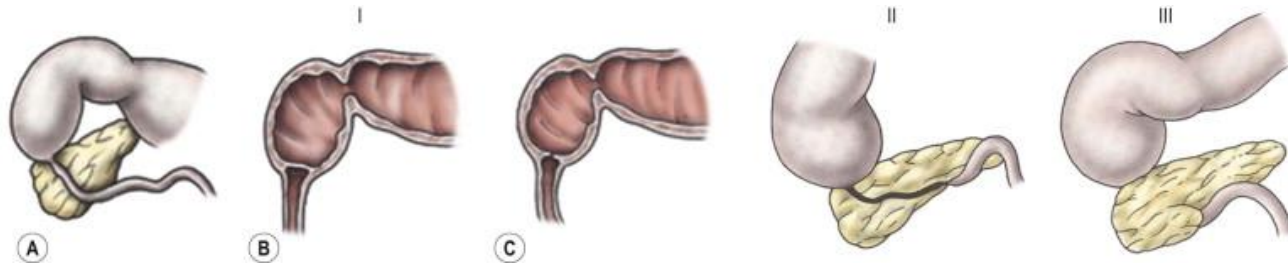
Wat is kinderchirurgie?

Algemene chirurgie (buikwandbreuk, blinde darmontsteking vasculaire toegang)

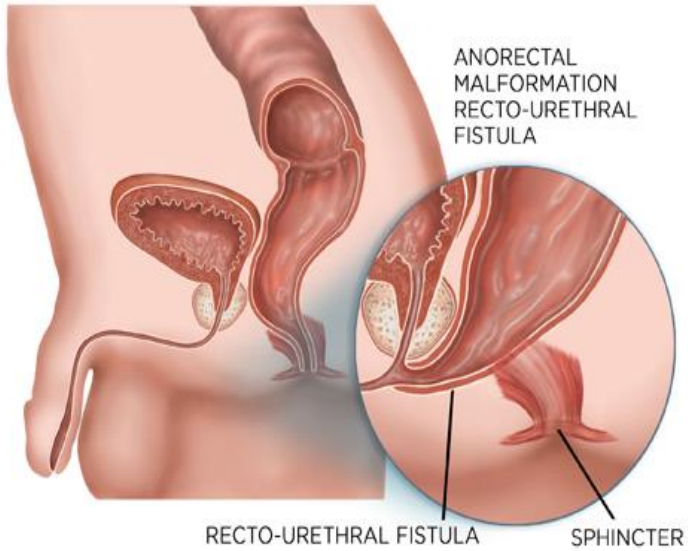
Aangeboren afwijkingen: atresie, long, Hirschsprung
lange termijn zorg



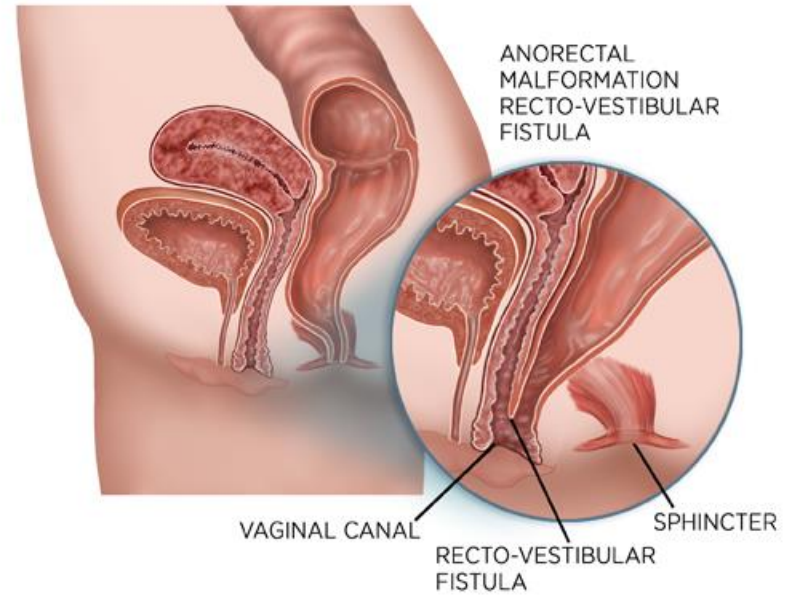




NORMAL DEVELOPMENT



NORMAL DEVELOPMENT



Wervel, hart, nieren, ledematen???

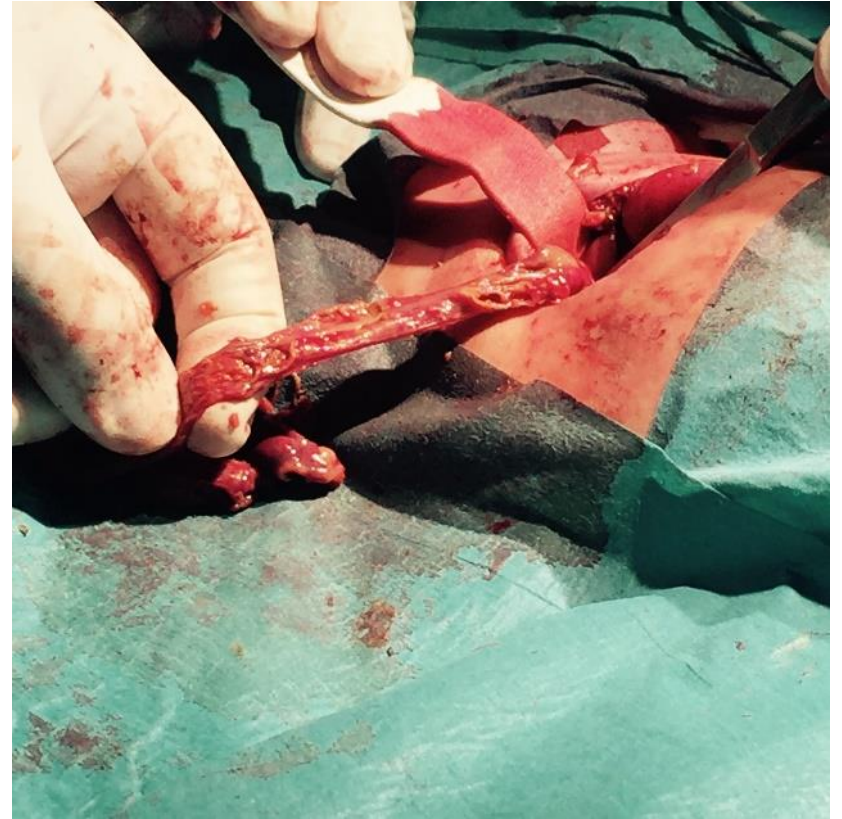


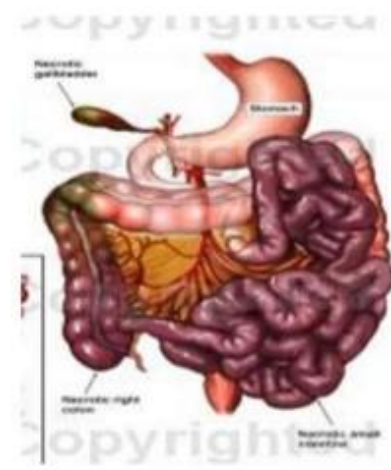
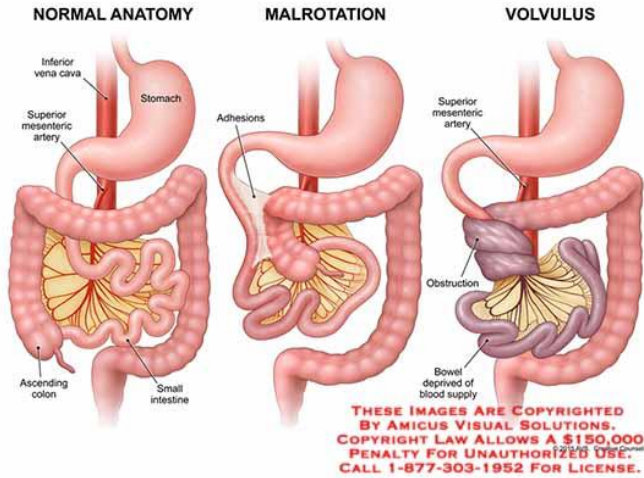
Wat is kinderchirurgie?

Algemene chirurgie (buikwandbreuk, blinde darmontsteking vasculaire toegang)

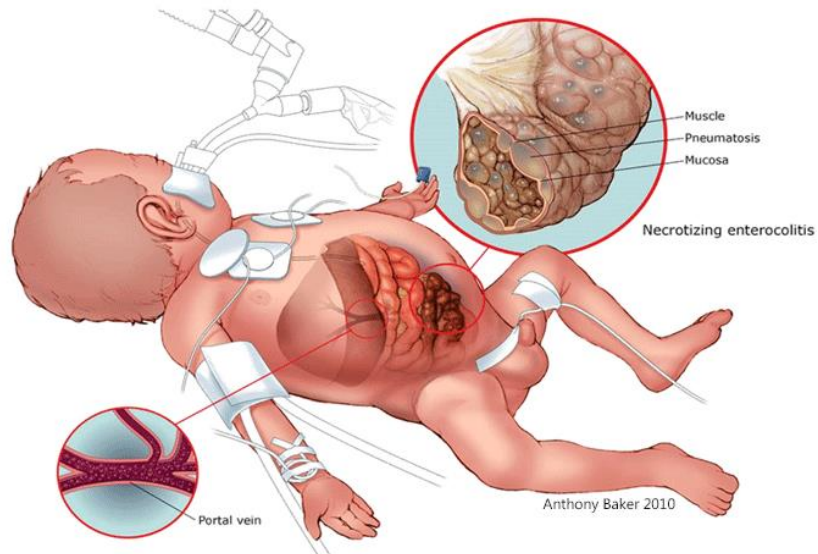
Aangeboren afwijkingen: atresie, long, Hirschsprung
lange termijn zorg

Acute neonatale chirurgie: NEC, volvulus





Acute: sudden abd pain out of proportion to exam; appear VERY ILL



Wat is kinderchirurgie?

Algemene chirurgie (buikwandbreuk, blinde darmontsteking vasculaire toegang, hobbels/knobbels/bobbels)

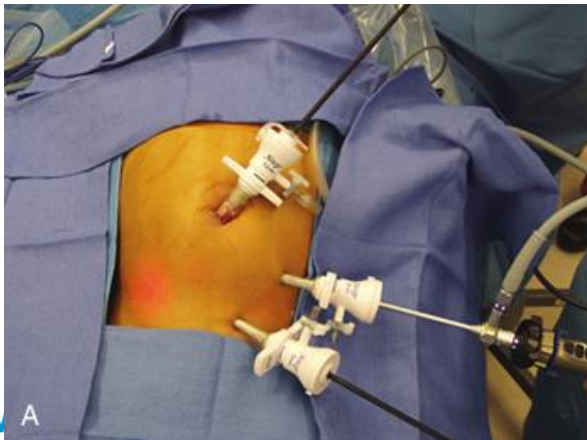
Aangeboren afwijkingen: atresie, Morbus Hirschsprung, longafwijkingen
lange termijn zorg, gastroschisis, omphalocoele, ovariumcyste

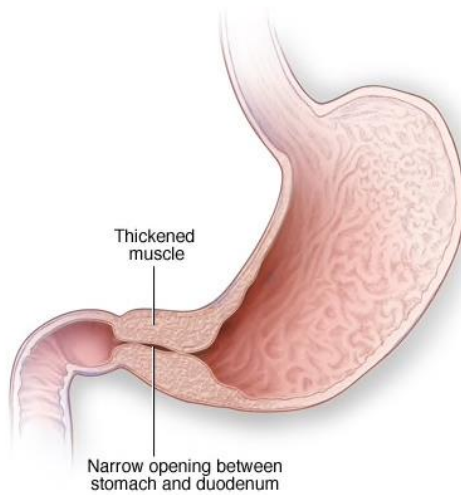
Acute neonatale chirurgie: NEC, volvulus

Aandoeningen tot aan adolescentie fase: voedingsproblematiek, Morbus Crohn, Colitis Ulcerosa, *kanker, trauma*

Urologie, KNO, neurochirurgie, orthopedie, oogheelkunde, cardiothoracale chirurgie, plastische chirurgie

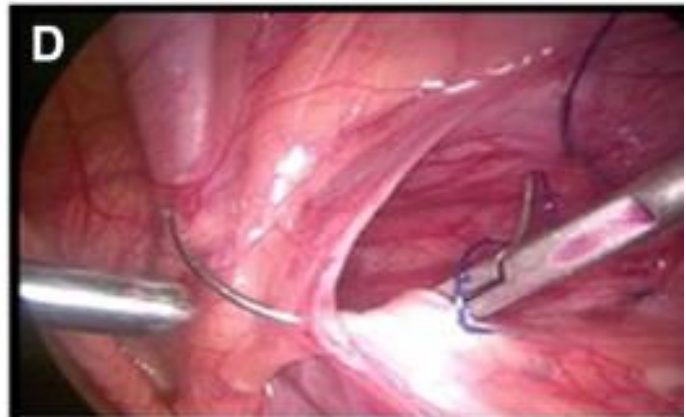
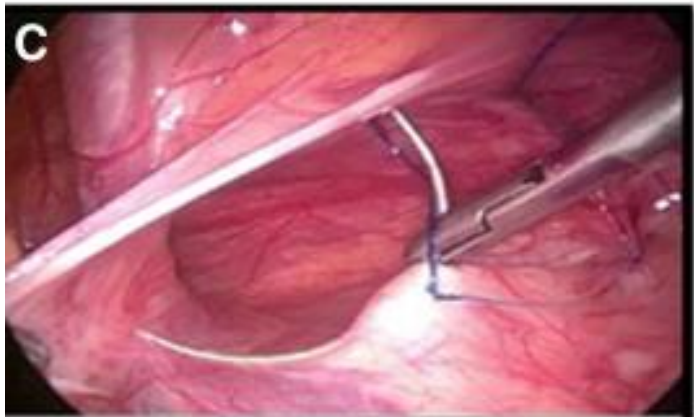
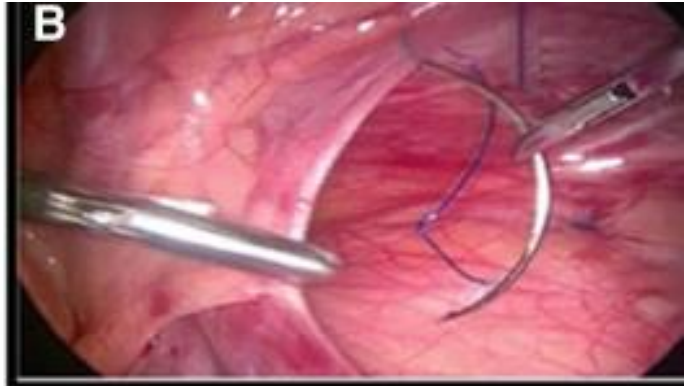
Minimaal invasief





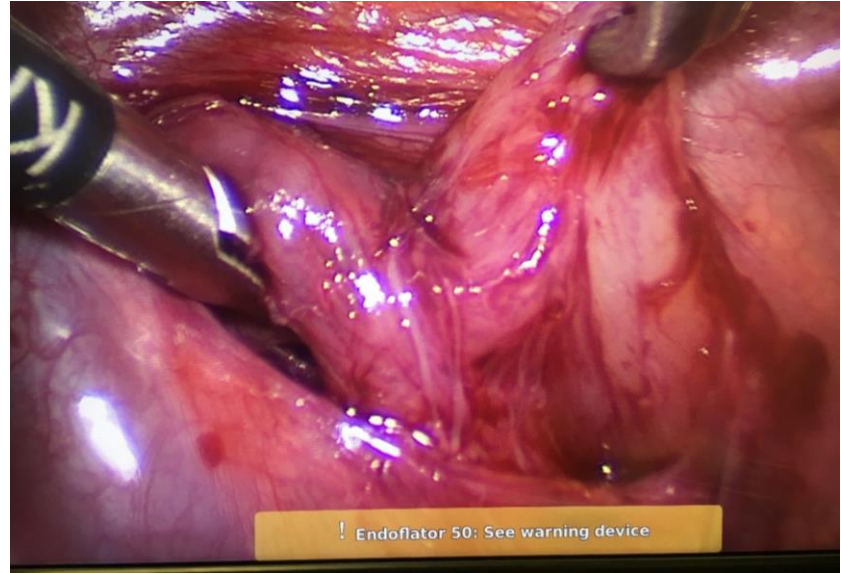
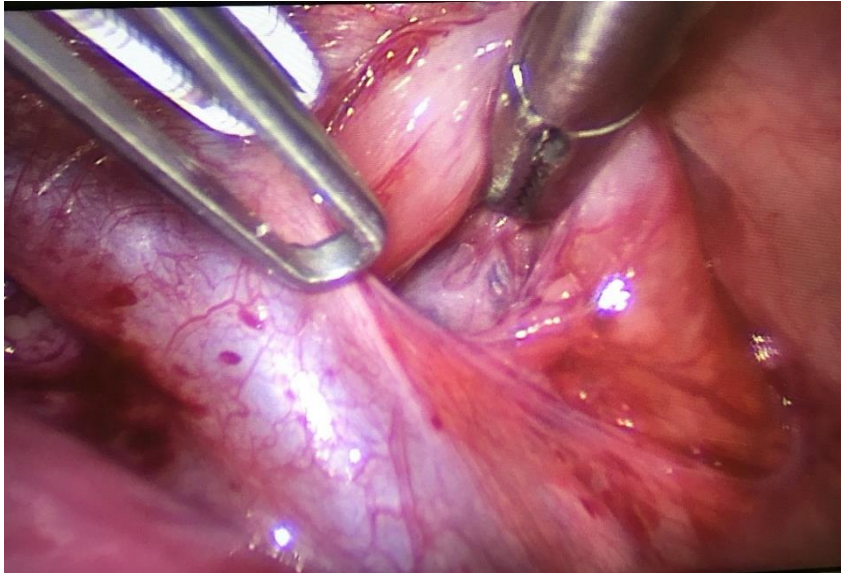
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De volgende stap?



©2013 Intuitive Surgical, Inc.

De spugende zuigeling

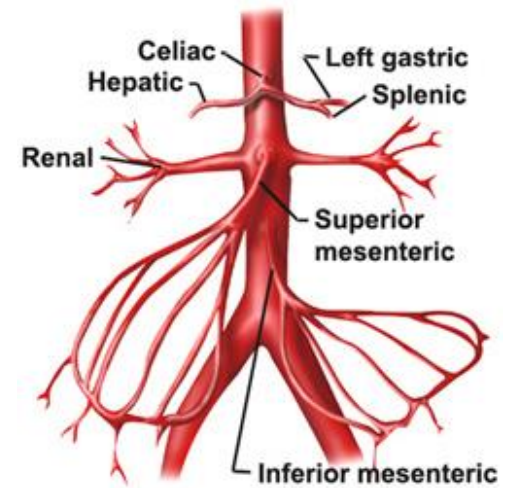
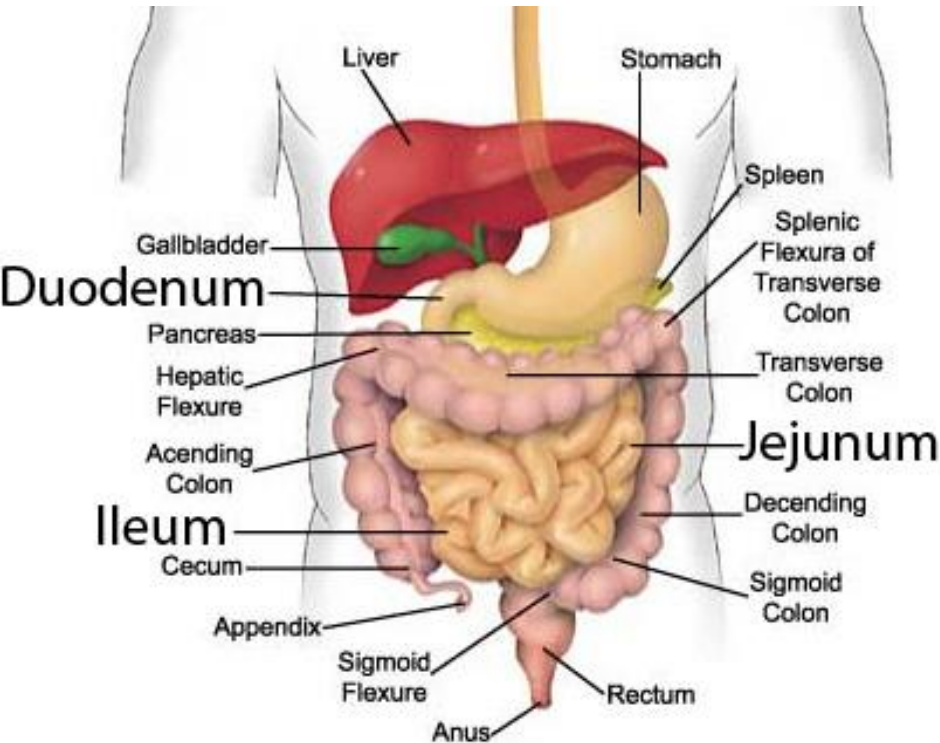
Ruben Visschers

Maastricht UMC+



Maastricht University

Anatomie



braken + abdominale distentie

=

teken van

intestinale obstructie

bij de pasgeborene

(opgepast hoge obstructie)

URGENTIE: wat te doen?

Wat te doen?

Klinisch onderzoek

Maag / darm decompressie met

naso-gastrische sonde (voorkomt braken en aspiratie)

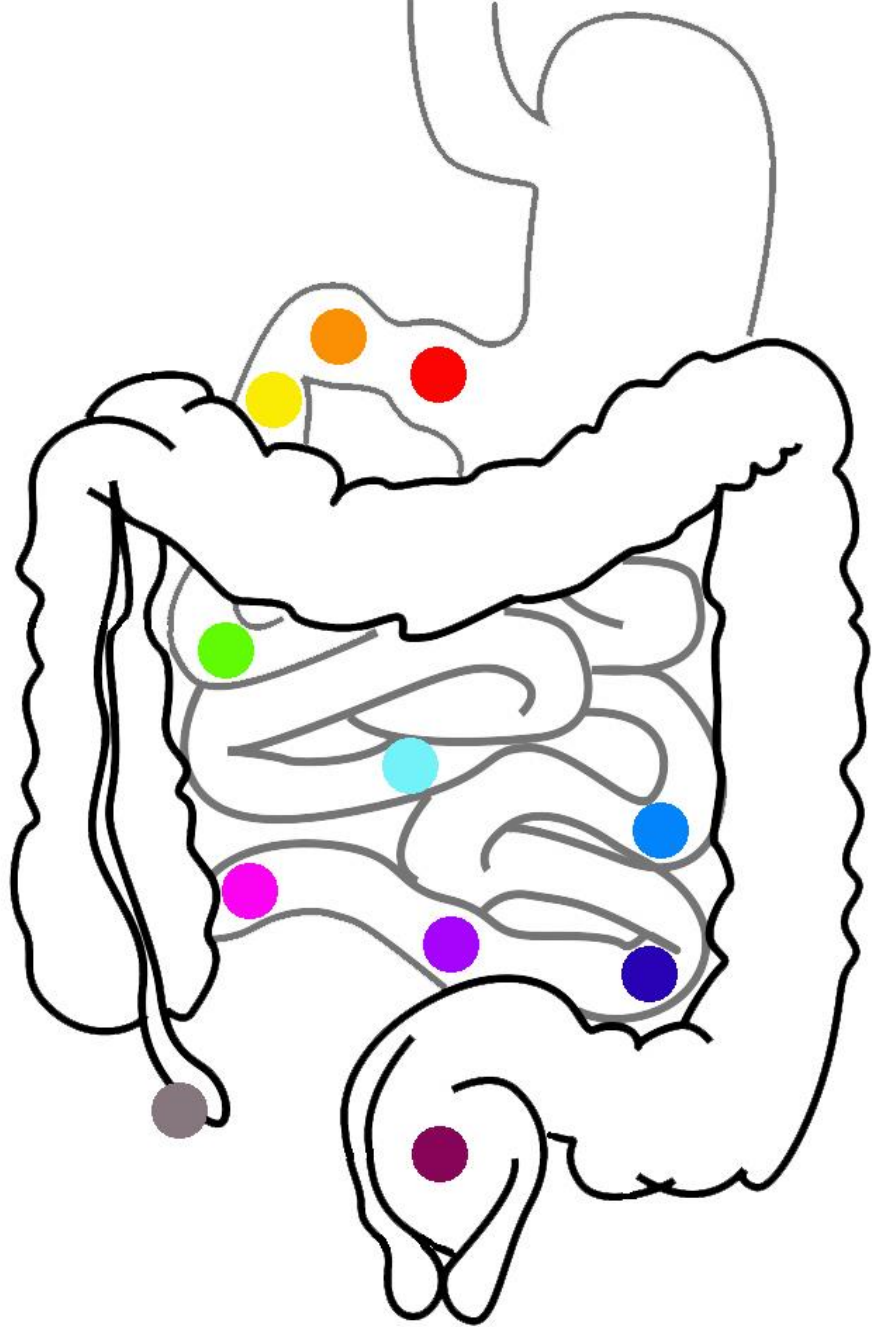
Infuus: vocht, electrolyten en voiding

Beeldvorming:

- **RX abdomen** (suggestief voor obstructie)
 - Uitgezette darmlussen
 - lucht/water spiegels
- **RX contrast**
- **Echo**

oorzaken intestinale obstructie

bij
zuigelingen



● Pylorus Hypertrofie

● Duodenum Atresie

● Pancreas Annulare

● Malrotatie / Volvulus

● Jejuno-ileale Atresie

● Meconium Ileus

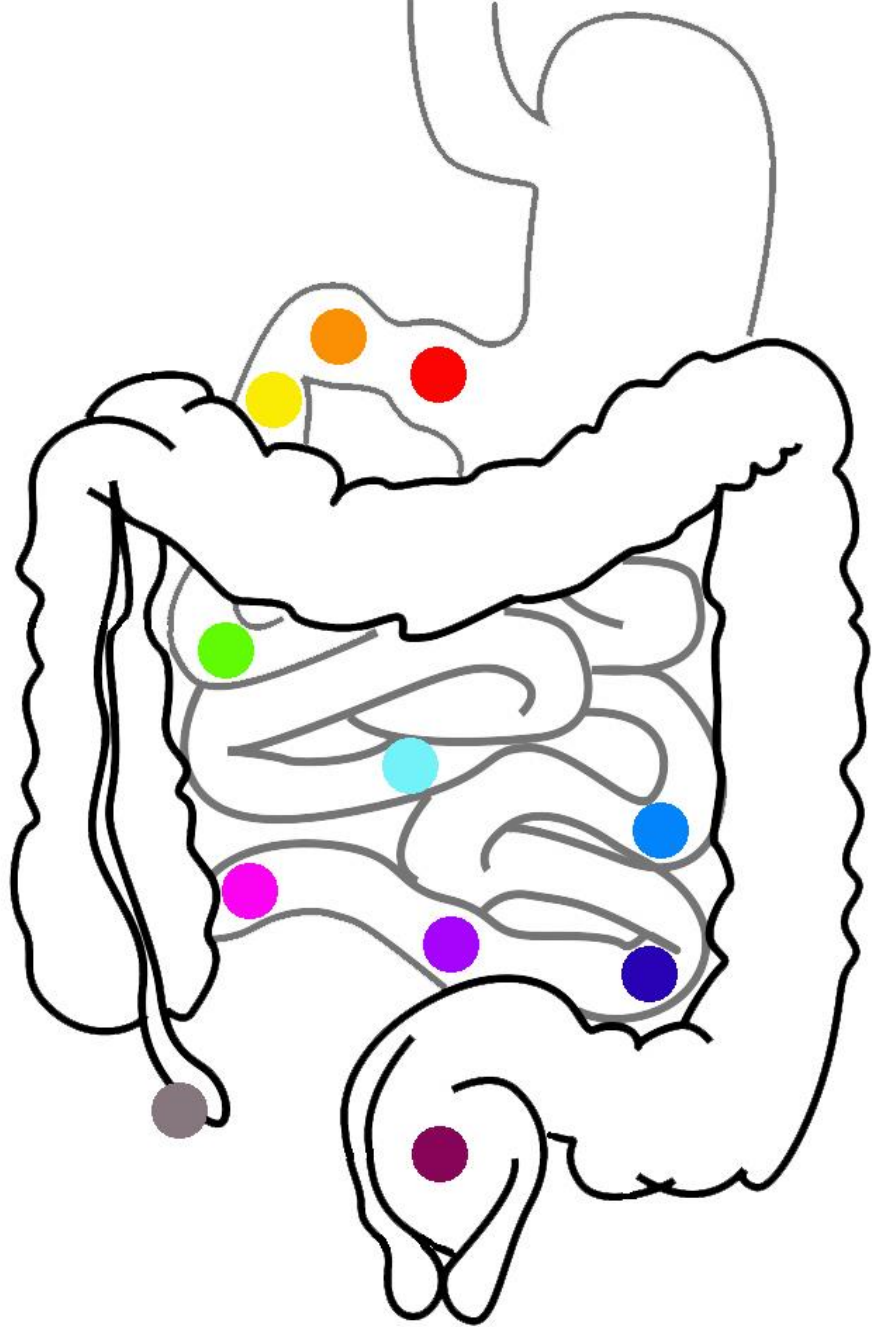
● Hernia Inguinalis

● NEC

● Invaginatie

● Hirschsprung / ARM

● Appendicitis



zweiling lies

Ruben Visschers

Maastricht UMC+



Maastricht University

DD swelling lies

Spectrum and Frequencies of Pathologic Conditions of the Scrotum in 750 Boys

Pathologic Condition	No. of Patients*
Epididymo-orchitis	156 (20.8)
Varicocele	154 (20.5)
Hydrocele	100 (13.3)
Torsion of the testicular appendages	58 (7.7)
Testicular torsion	50 (6.7)
Systemic diseases with scrotal involvement	50 (6.7)
Traumatic lesions	46 (6.1)
Inguinal hernia	40 (5.3)
Tumors	35 (4.7)
Testicular microlithiasis	8 (1.1)
Other conditions	53 (7.1)

*Values in parentheses are percentages.

Hernia inguinalis bij kinderen

- Aangeboren
- Incidentie: 08-4.4%
 - Prematuren: 16-25% (risico op inklemming lager, 28% vs 13-18%)
- Re>li
- Man>vrouw

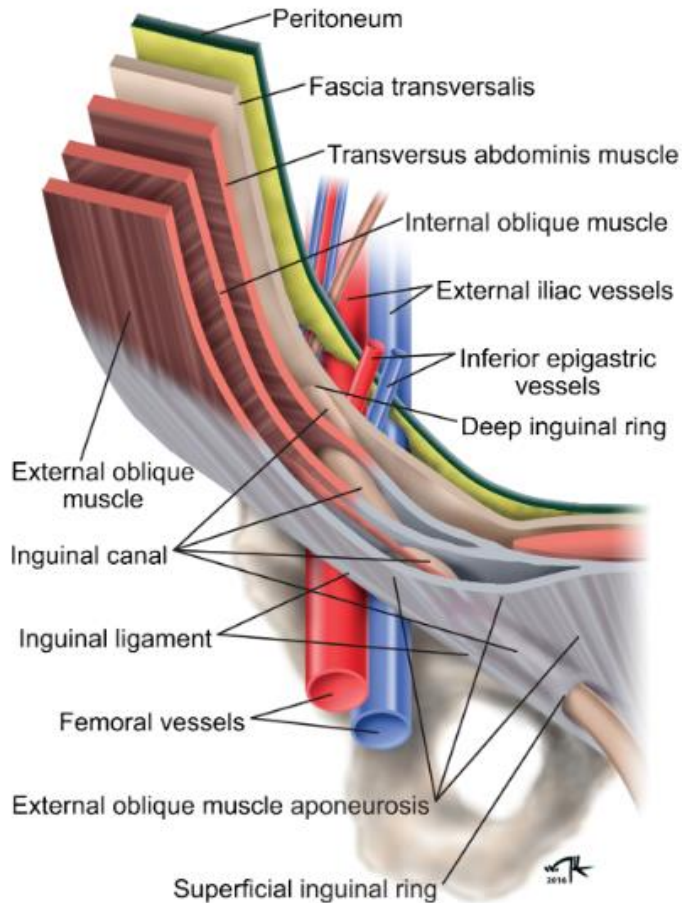


Fig. 1 Diagram of right inguinal canal anatomy depicts the main elements that form the boundaries of inguinal canal, a narrow diagonal passage that extends from the deep inguinal ring to the superficial inguinal ring, superior and parallel to the inguinal ligament (Published with kind permission of Dr. Walther Y. Ishikawa, © 2016, all rights reserved)

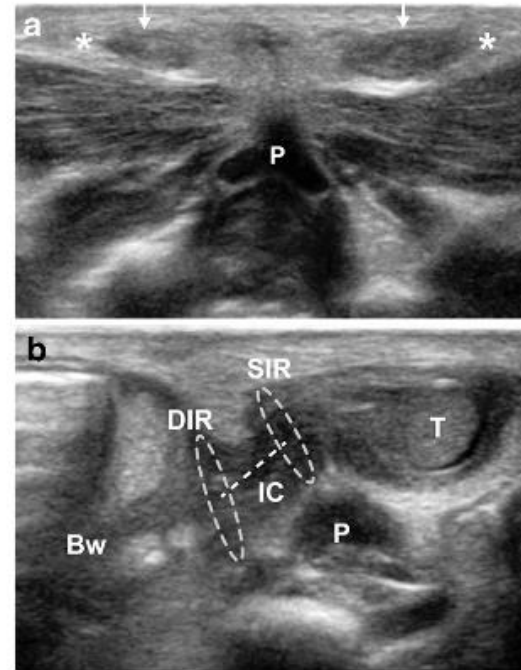


Fig. 2 Inguinal canal in a premature infant. Gray-scale US images in axial (a) and longitudinal (b) projections of the inguinal canal in a boy born prematurely at 29 weeks' gestation and weighing 720 g. **a** The superficial inguinal rings (arrows) mark the end of the inguinal canals, are located just superior and lateral to the pubic tubercle (P), and have a triangular opening formed by the evagination of the external oblique muscle aponeuroses (*). **b** The inguinal canal (IC) extends from the deep inguinal ring (DIR) to the superficial inguinal ring (SIR). In this baby the inguinal canal length is about 0.7 cm. Bw bowel, P pubic tubercle, T testis

The deep inguinal ring is located above the midpoint of the inguinal ligament, lateral to the epigastric vessels (Figs. 1, 2 and

Indalen in de 7-9^e maand

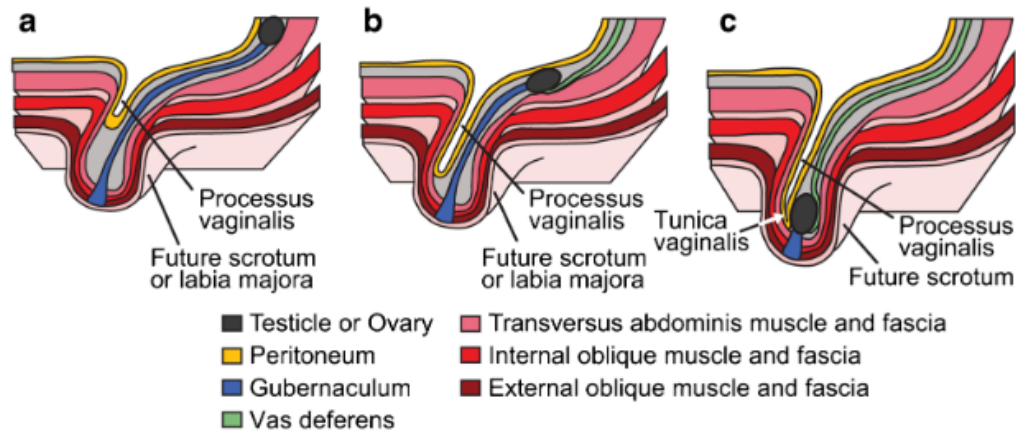


Fig. 4 Schematic drawings illustrate the sequence of normal descent of the gonad, guided by the gubernaculum. **a** The processus vaginalis, a peritoneal evagination, appears around 13 weeks of gestation following the gubernaculum tissue toward future scrotum or labia majora. **b** In males the normal inguinoscrotal testis descent starts around 28 weeks of development with the passage of testis into the inguinal canal; whereas in females the descent of ovary stops in the pelvis, then the processus

vaginalis eventually disappears and the remains of gubernaculum become the ovarian ligament and the round ligament of the uterus. **c** In males the testis descent toward the scrotum is actively driven by the shortening of gubernaculum and intra-abdominal pressure. The remnant of distal gubernaculum becomes the scrotal ligament. (Adapted from [6] with permission) Illustrations courtesy of Ana C. Miti Sameshima

Niet sluiten van de processus vaginalis/ kanaal van Nuck



Hydrocoele

Testis-communicans-funiculi

DD/ hernia inguinalis

A/

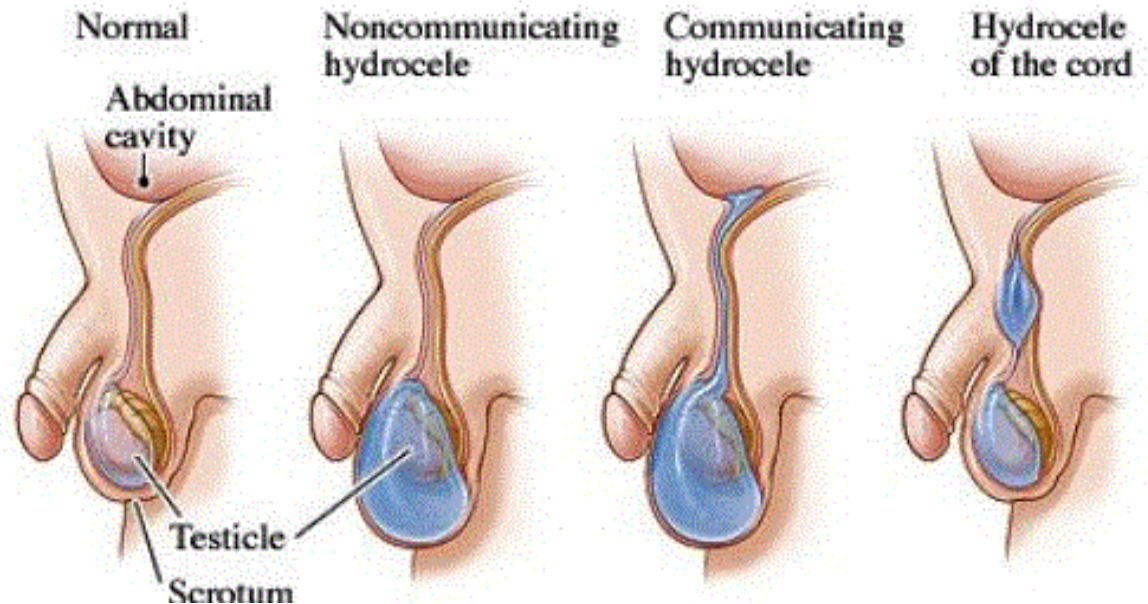
- (intermittente/peristerende) inguinale/scrotale zwelling

O/

- (niet reponibel)
- Doorlichtbaar

B/

- > 1 jaar: resectie



Factors Contributing to the Development of an Indirect Inguinal Hernia

Urogenital
Undescended testis
Exstrophy of bladder
Increased peritoneal fluid
Ascites
Ventriculoperitoneal shunt
Peritoneal dialysis
Increased intra-abdominal pressure
Repair of exomphalos or gastroschisis
Severe ascites (e.g., chylous)
Meconium peritonitis
Chronic respiratory disease
Cystic fibrosis
Connective tissue disorders
Ehlers-Danlos syndrome
Hunter-Hurler syndrome
Marfan syndrome
Mucopolysaccharidosis



- Vocht in de buik
- Verhoogde druk
- bindweefselstoornis

Presentatie

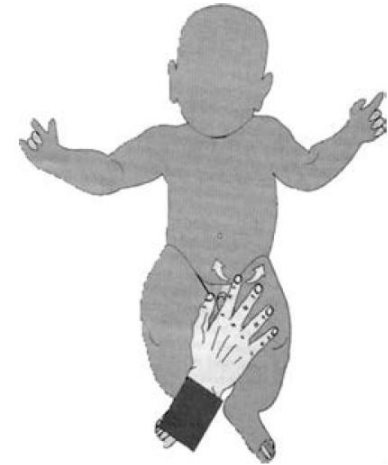
- Zwelling, intermitterend, mn bij verhoogde intra-abdominale druk
- Vaak asymptomatisch ⇔ pijn gerelateerd aan breuk?
 - Hydrocele?
 - Niet-ingedaalde testis?
 - Abces?

Inklemming?

1. Needs to be fed
2. Needs a diaper change
3. Needs a nap
4. Needs and operation..

Onderzoek

- Identificeer en isoleer testikel in scrotum
- Identificeer resterende inguinale massa
- Verdikking: Silk glove sign/ Plastic baggy sign
- Verhaal ouders/ foto
- Beeldvorming?



Richtlijnen

- NL (2003): algemeen, sens en spec echo in het algemeen laag

3.3 Diagnostiek

Hoe wordt de diagnose liesbreuk bij een kind gesteld?

Conclusie

Niveau 4 De diagnose liesbreuk wordt gesteld door middel van inspectie en palpatie.

Aanbeveling

C Het wordt aanbevolen de diagnose liesbreuk bij kinderen te stellen door middel van eigen inspectie en palpatie.

- Internationaal
 - IPEG: geen advies
 - Hernia society: geen richtlijn mbt kinderen
- Boekenwijsheid (Holcomb/Coran): Klinische bevinding, echo is een optie

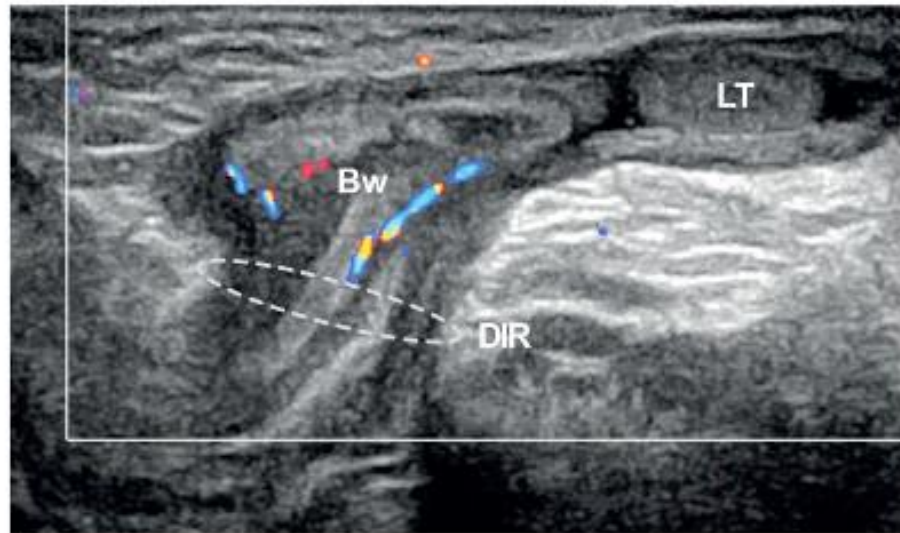


Fig. 15 Reducible indirect inguinal hernia in a 3-month-old boy, born prematurely at 24 weeks of gestation. Color Doppler US longitudinal projection of the left inguinal canal shows bowel (*Bw*) herniating through the patent deep inguinal ring (*DIR*) into the inguinal canal. The bowel is easily returned to the abdominal cavity, as observed in real-time evaluation. The bowel blood supply is normal. *LT* left testis

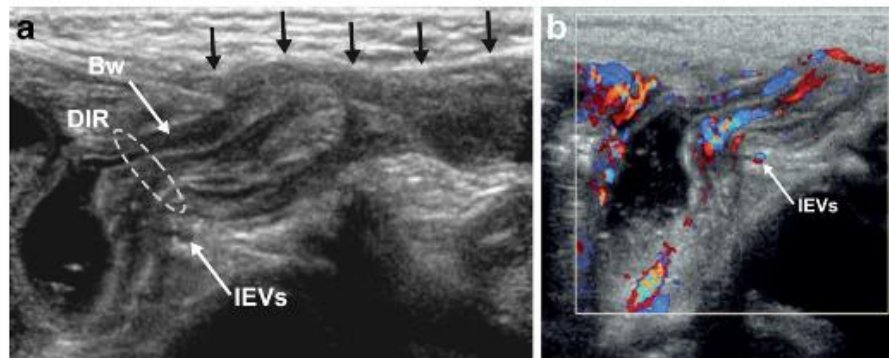


Fig. 16 Incarcerated indirect inguinal hernia in a 2-month-old boy who was admitted inconsolable to the emergency room with abdominal pain and diarrhea. **a** The abdominal US shows an irreducible inguinal hernia on the right side, i.e. the bowel (*Bw*) moved into the patent processus vaginalis (*black arrows*), lateral to the inferior epigastric vessels (*IEVs*). **b**

Under color Doppler evaluation, the intestinal blood supply was preserved. An incarcerated hernia was diagnosed. The position of the hernia lateral to the inferior epigastric vessels (*IEVs*) indicates that this is an indirect inguinal hernia (**a, b**). *DIR* deep inguinal ring

Ultrasound misleading?

Preoperative Sonography of Nonreducible Inguinal Masses in Girls

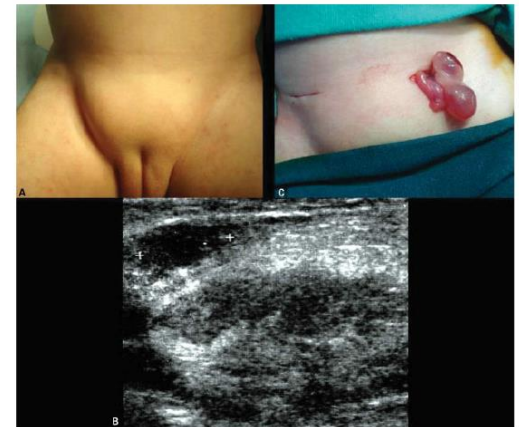
Adnan Narcı, MD,¹ Mevlit Korkmaz, MD,¹ Ramazan Albayrak, MD,²
Selami Sözübir, MD,³ Bekir Haluk Güvenç, MD,⁴ Reşit Köken, MD,⁵
Tevfik Demir, MD,⁵ Ömer Doğru, MD⁵

Verkeerde diagnose bij 3 van de 9

Ovariële cyste in de breuk gemist (ipv lymfeklier)

Geïnfecteerde lymfeklier gemist (ipv darm)

Cyste in kanaal van Nuck (ipv overiële cyste)



Preoperative Ultrasound and Intraoperative Findings of Inguinal Hernias in Children: A Prospective Study of 642 Children

By Ilan Erez, Valeria Rathause, Igor Vacian, Edna Zohar, David Hoppenstein, Miriam Werner, Ludwig Lazar, and Enrique Freud
Kfar-Saba, Israel

Correlatie echo met operatieve bevindingen

Table 1. Correlation Between Sonographic Dimensions of the Inguinal Canal and Operative Findings

	Not Operated	No Findings in Operation	PPV	Hernia	Large Hernia	Hydrocele
No. of procedures	494	34	238	407	84	27
Ultrasound width of inguinal canal (mm)	3.3 ± 0.8	3.6 ± 0.8	4.9 ± 1.1	7.2 ± 2.0	12.8 ± 3.6	4.8 ± 2.2

NOTE. Values are numbers ± STD. *P* less than .05 when comparing between entities except when comparing PPV versus hydrocele.

Table 2. Distribution of Sonographic and Operative Findings According to Age Groups

	No. of Procedures	Ultrasound Findings (mm)					Hydrocele
		Not Operated	No Findings in Operation	PPV	Hernia	Large Hernia	
1-12 mo	92	3.9 ± 0.9	3.0 ± 0.0	4.3 ± 1.3	7.3 ± 2.1	10.1 ± 2.5	9.0 ± 0.0
13-24 mo	276	3.5 ± 0.9	NA	5.2 ± 0.7	7.7 ± 1.8	12.1 ± 2.6	5.3 ± 0.1
25-36 mo	284	3.2 ± 0.7	3.7 ± 0.5	5.0 ± 1.2	6.6 ± 1.7	13.9 ± 4.1	2.9 ± 1.7
37-48 mo	212	3.1 ± 0.6	3.2 ± 0.2	4.6 ± 1.0	6.2 ± 1.6	15.5 ± 0.6	5.0 ± 1.2
49-60 mo	60	3.1 ± 0.4	3.4 ± 0.1	5.4 ± 0.6	8.6 ± 2.2	NA	NA
61-72 mo	80	3.2 ± 0.5	5.6 ± 0.2	5.4 ± 1.2	8.6 ± 3.3	NA	NA
73-84 mo	54	3.4 ± 0.6	NA	5.2 ± 0.8	8.2 ± 3.5	16.7 ± 0.5	NA
85-96 mo	52	3.4 ± 0.6	4.6 ± 0.6	6.0 ± 1.1	8.1 ± 2.7	17.6 ± 0.6	3.0 ± 0.0
97-120 mo	102	3.2 ± 0.9	4.1 ± 0.3	4.9 ± 0.9	6.4 ± 0.6	12.0 ± 1.1	NA
121-176 mo	72	3.2 ± 0.5	NA	4.0 ± 0.8	6.5 ± 0.9	NA	NA

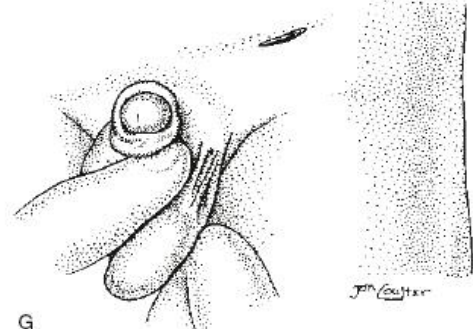
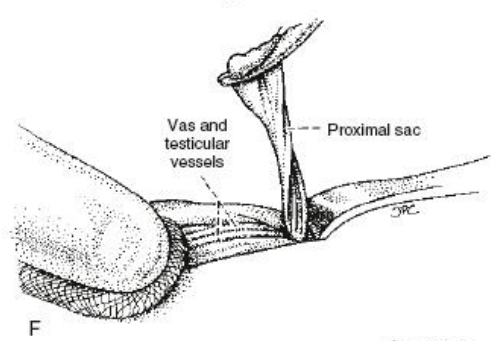
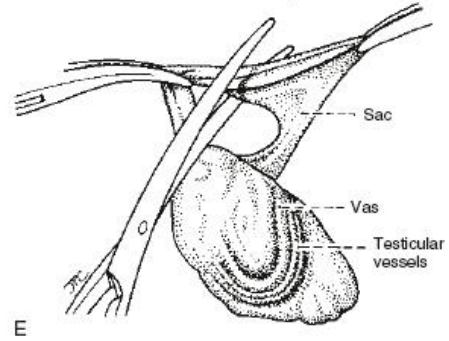
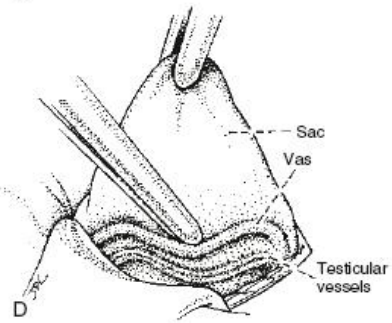
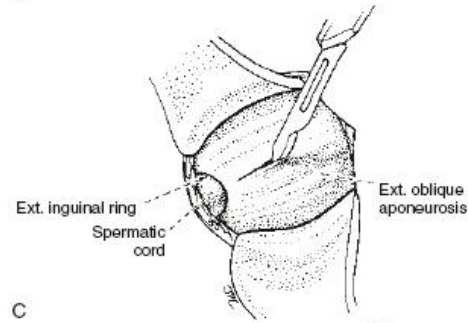
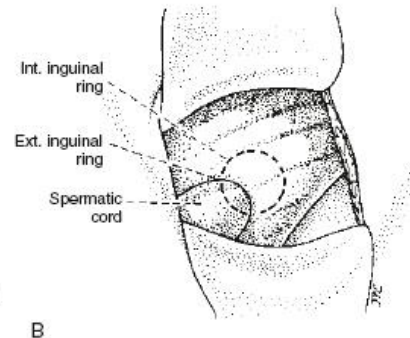
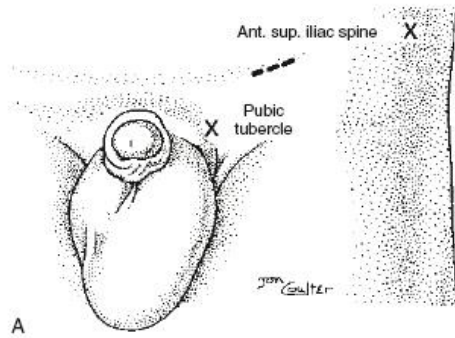
Abbreviation: NA, not applicable.

Herniography (peritoneography)



Behandeling

- Geen spontaan herstel te verwachten
- Operatief
 - Herniotomie
 - Laparoscopie
 - Ligatuur
 - Overhechten
- Operatie bij voorkeur <1mnd na vaststellen bij a terme
- Bij voorkeur >2kg en >60wk postconceptie
 - Prematuur 24wk en <64wk postconceptie verhoogd risico op post-op apneu
- Na incarceratie 24-48hr rustperiode
 - Testikel en ovarium
- Contralaterale exploratie?



Laparoscopy

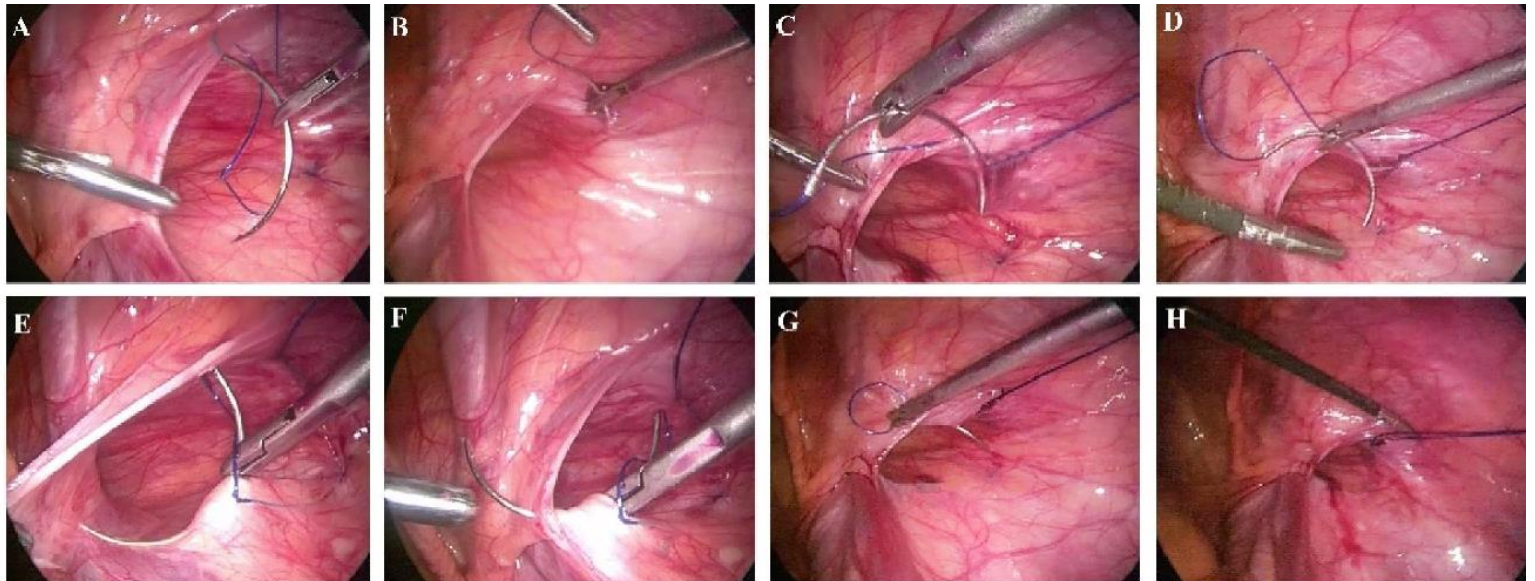
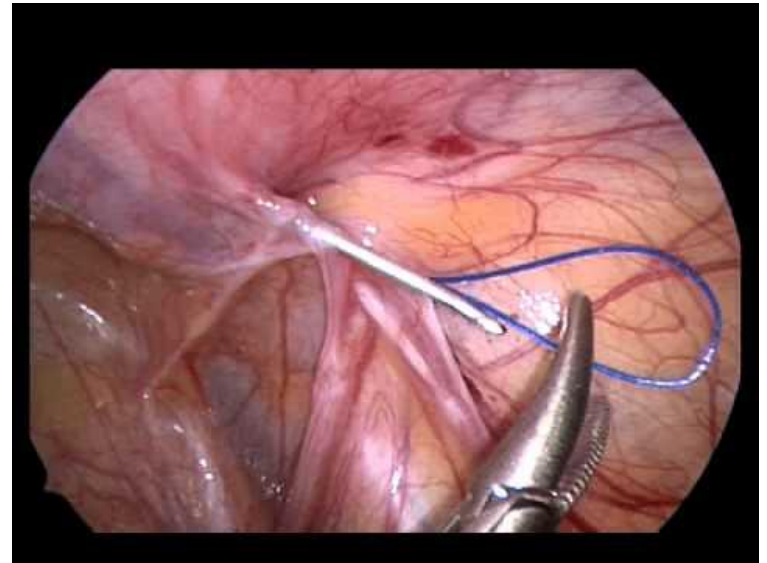
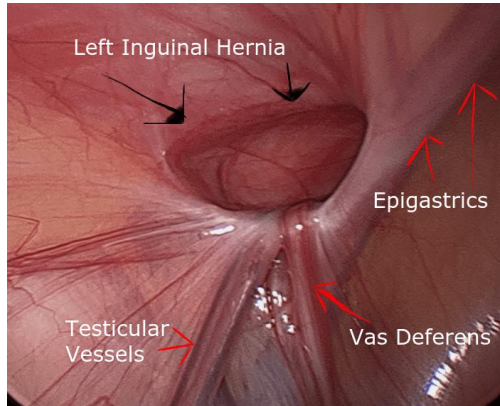


Fig. 1 showing the steps of intracorporeal purse string leaving the hernia sac intact. Needle is passing around the

Appendicitis

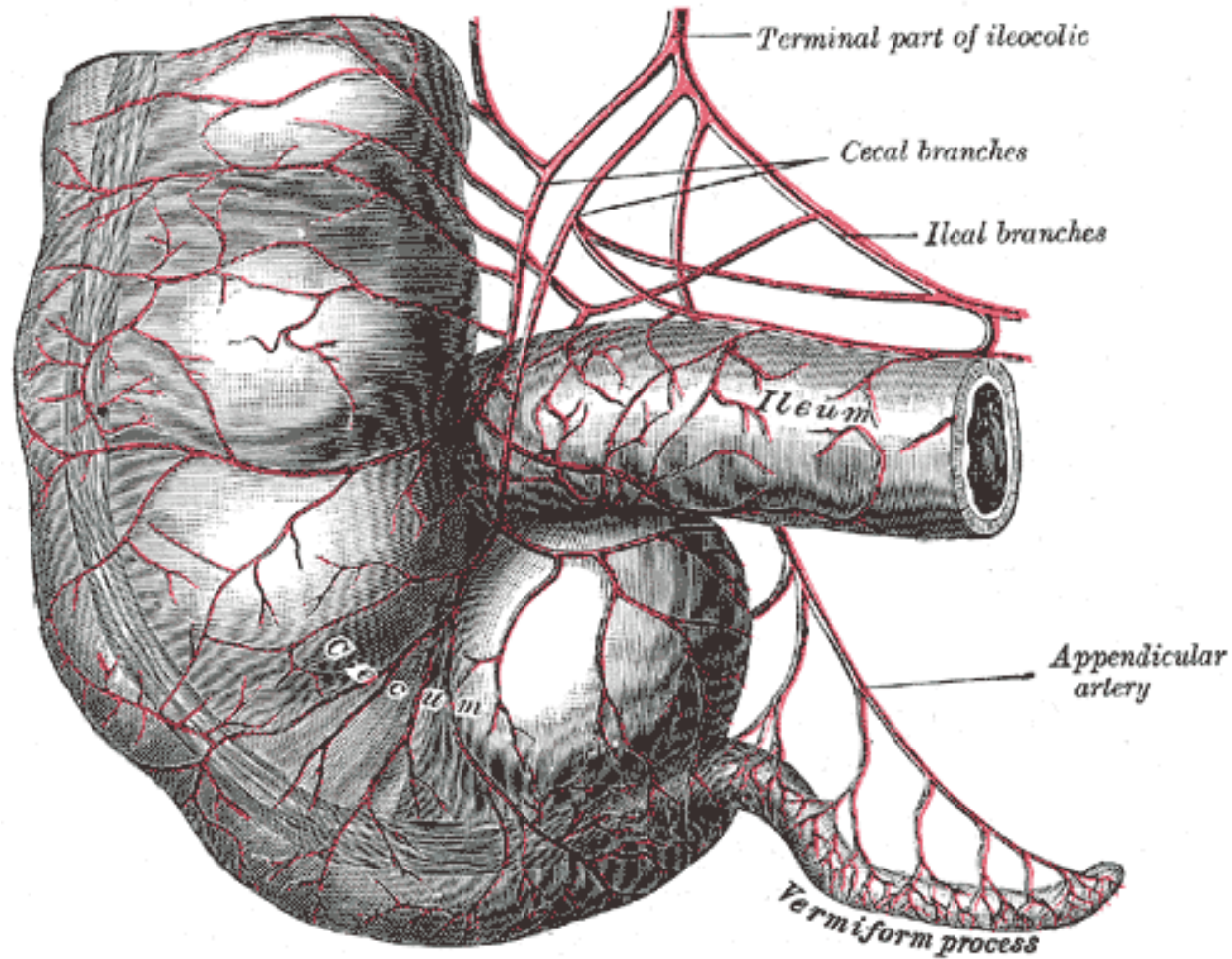
Maastricht UMC+



Maastricht University

Appendicitis

Key anatomical points



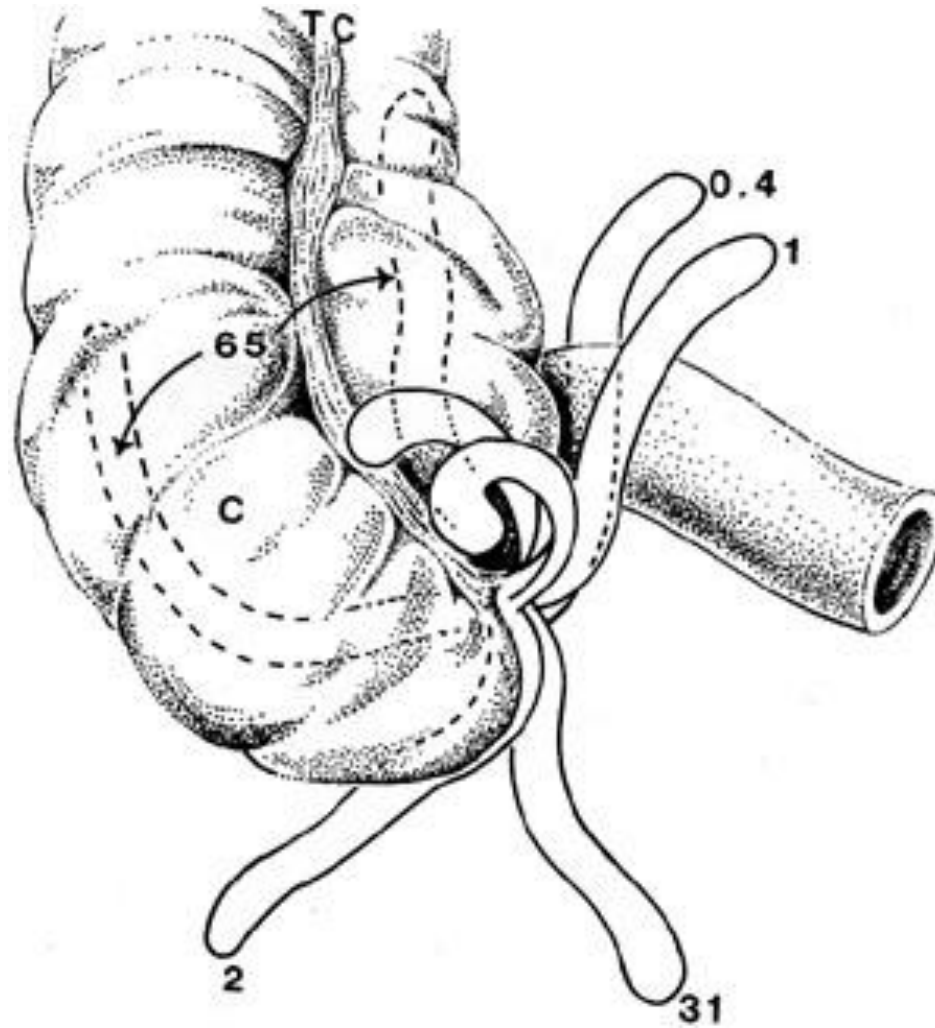
Etiologie

- Meest voorkomende acute chirurgische indicatie
- Life-time risico: 8.7% in jongens; 6.7% in meisjes
- Piekincidentie: 12-18 jaar
 - Maar komt op alle leeftijden voor
- Fecoliet → occlusief → bacteriële overgroei + necrose
 - Flegmoneus
 - Perforatie

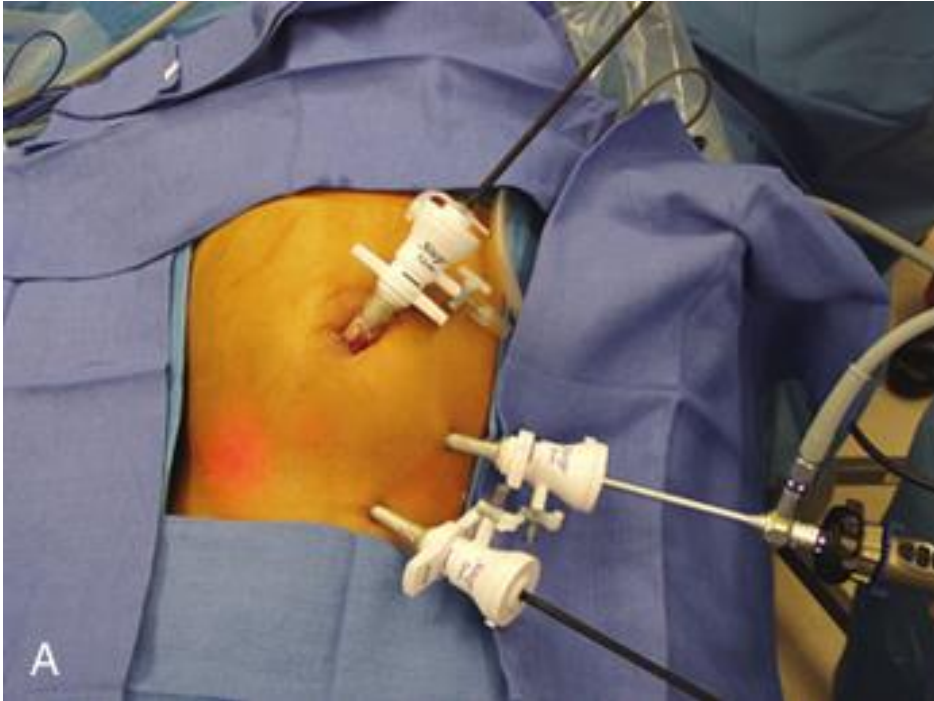
Diagnostiek + behandeling

- Kliniek en lab?
- Echo: 1e keus
- MRI: geen stralen belasting, niet altijd beschikbaar
 - (bij zwangere vrouwen)
- (CT: indien ziek of niet echogeniek bij volwassenen/ zelden bij kinderen vw stralenbelasting)
- *Diagnostische laparoscopie?*
- Operatie vs antibioticum

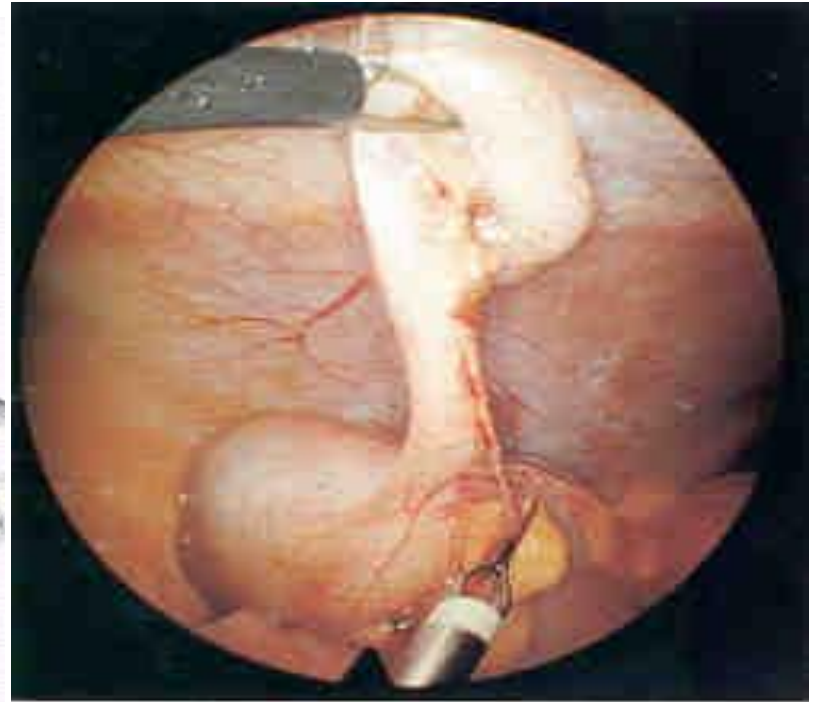
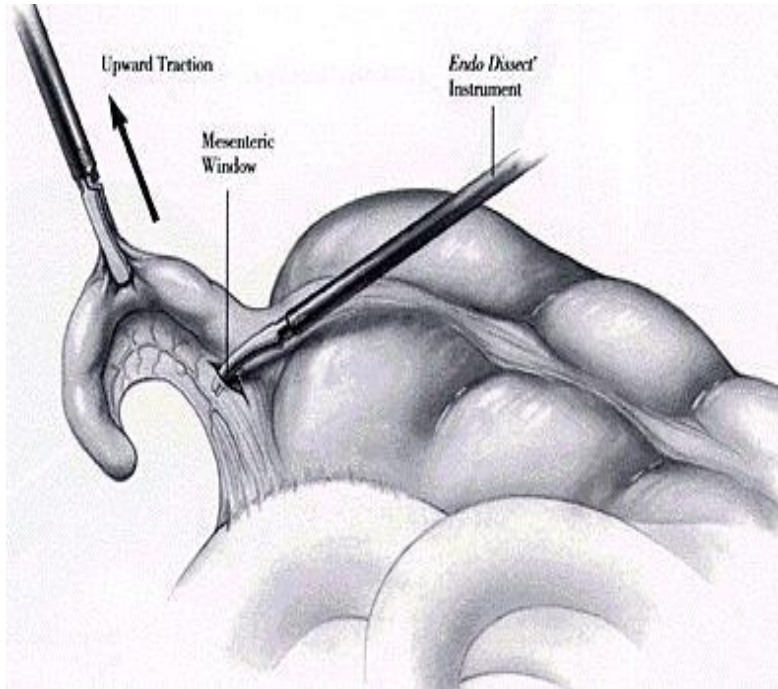
Ligging appendix



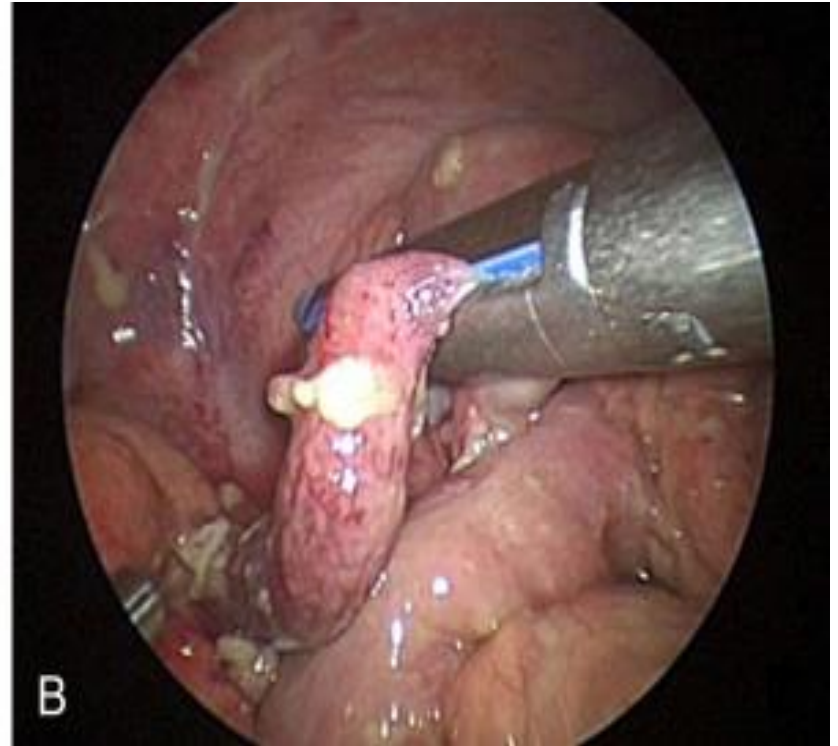
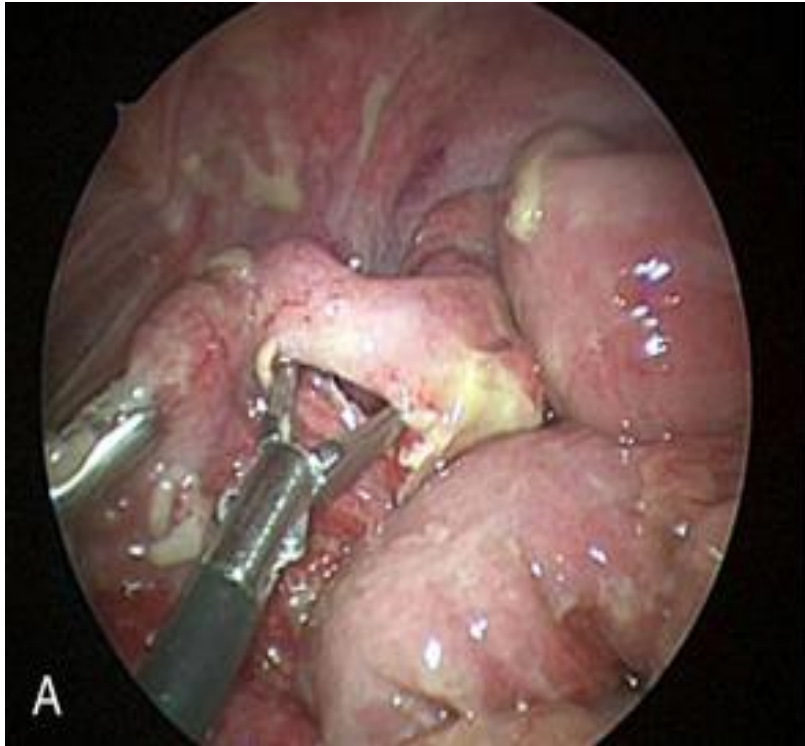
Laparoscopic Appendectomy



Laparoscopic Appendicectomy



Laparoscopic Appendectomy



Nabehandeling

Postoperatief geen vs 3 dagen antibioticum

Cave abcesvorming

Wondinfecties

Pylorushypertrofie

Maastricht UMC+



Maastricht University

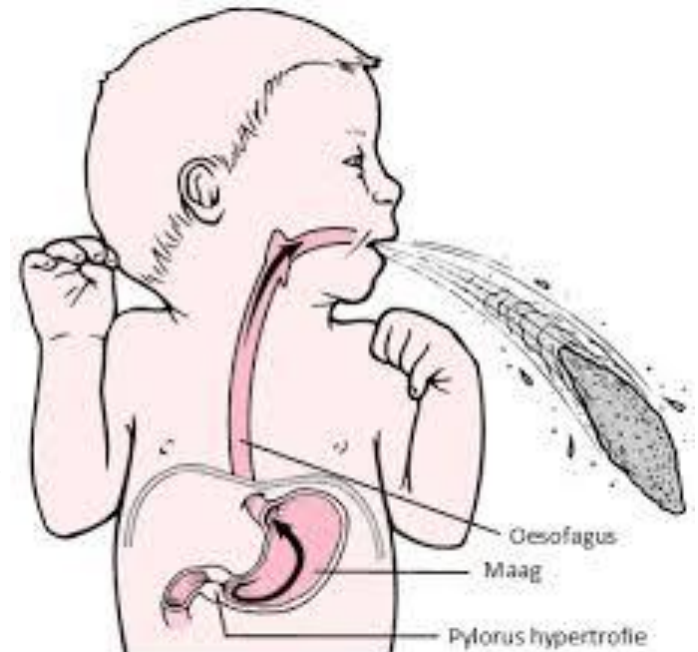
Pylorushypertrophie

Epidemiologie

- 1-4/ 1000

@RISK

- Man=4xV
- kaukasisch
- Jonge moeder
- 1^e kind
- Seizoensgebonden?
- Erythromycine blootstelling tijdens zws



Pylorushypertrophie

S/

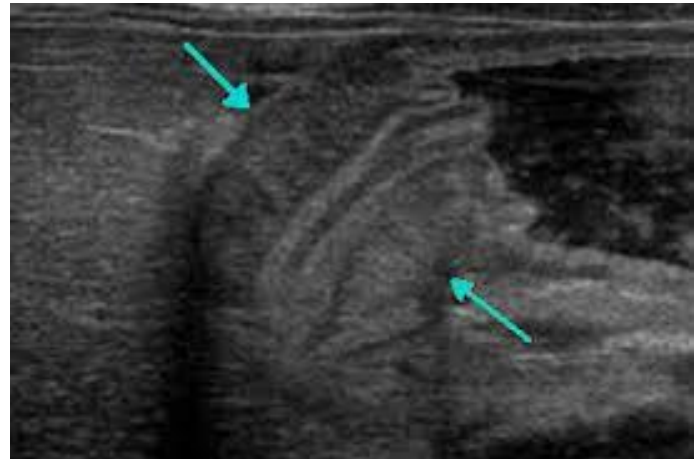
- Projectiel niet-gallig braken op week 2-8 (soms + koffiegruis)

O/

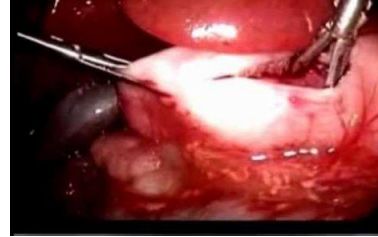
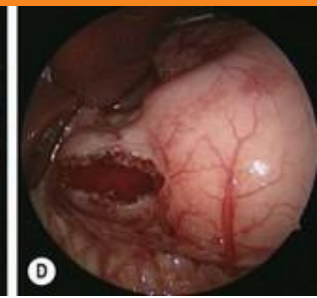
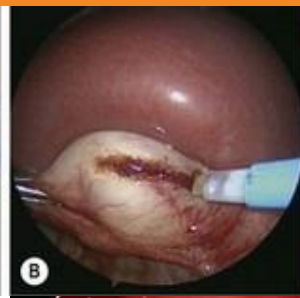
- Somnolent bij dehydratie
- Zichtbare peristalsis maag
- Palpabele pyloor (bij 80%)
- Olijfvormige zwelling

D/ Echo:

- Spierdikte $>4\text{mm}$ ($>3\text{mm}$ als $<30\text{d}$)
- Pyloorkanaallengte >12 a 16mm



Pylorushype



Pre-operatief:

- NPO
- (NMS)
- Correctie hypoCl⁻ en hypoK⁺
 - Bij matige of trage correctie: risk op apnee postop door verminderde AH-drive

Lap pyloromyotomie

Postop: Ad libitum drinken

Complicaties:

- | | |
|--|---|
| – Mucosaperforatie: 1-2%
nieuwe tomie | Hechten + omentumpatch + 180°
contralat |
| – Duodenumletsel: 3% | |
| – Littekenbreuk: 1% | vnl omentum door poort: ligatureren + huidsteek |
| – Peristerende vomitus: 2-26% | tgv GER of incomplete sectie |

Pylorus-hypertrophie

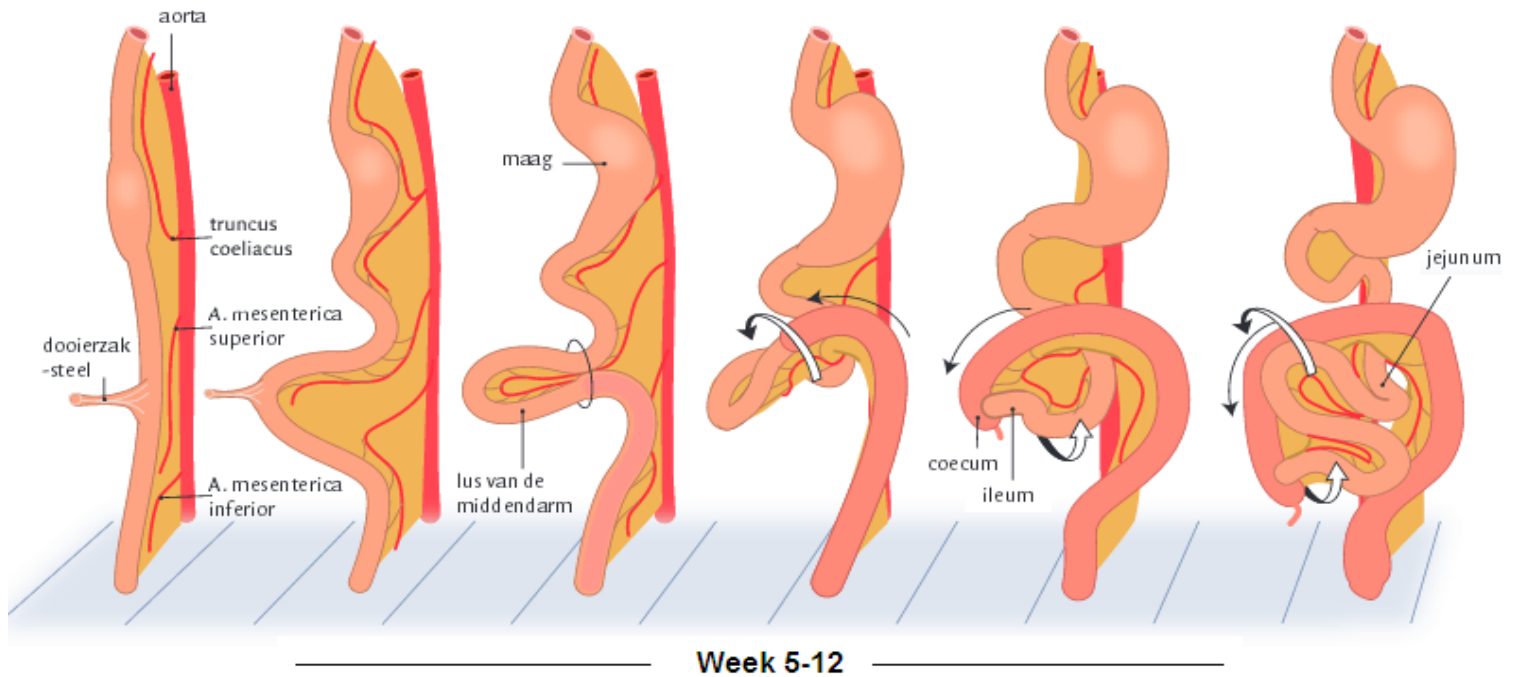
- D/
 - *RX + contrast: muizenstaart*
 - Echo: dikker dan 2x3mm + lengte +12mm
 - Lab: electrolieten bepalen
- DD/
 - Reflux: minder explosief
 - Duodenum obstructie
- B/
 - MS + elektrolieten + Pyloromyotomie → 3volledige voedingen zonder braken= NH

Malrotatie

Maastricht UMC+



Embryonale ontwikkeling

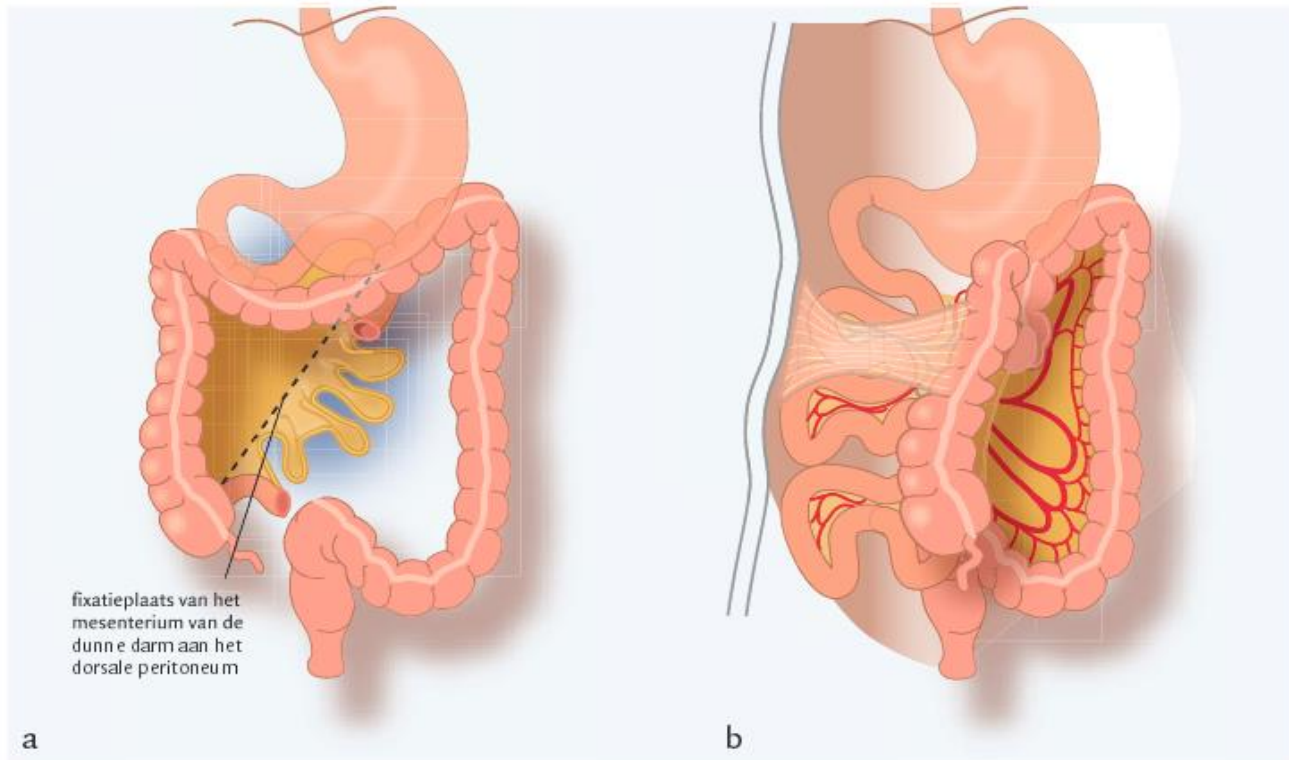


Malrotatie – inleiding

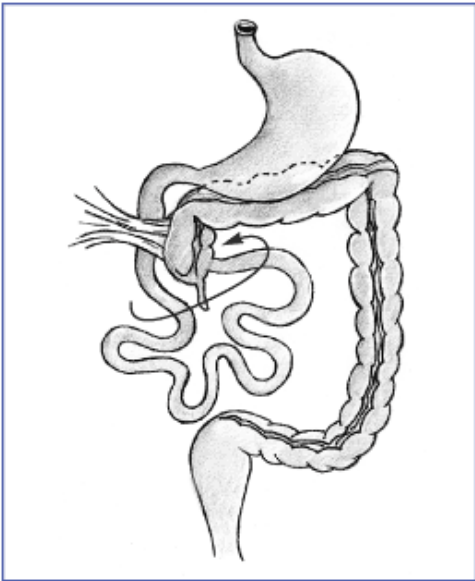
Malrotatie

- Pathofysiologie
 - Embryonale aanlegstoornis waarbij het coecum niet volledig naar zijn normale anatomische positie is geroteerd
- Associatie
 - Omphalocele, gastroschisis, congenitale hernia diafragmatica
- Incidentie
 - 2-5 per 1000 geboorten
- 75-90% in 1^{ste} levensjaar

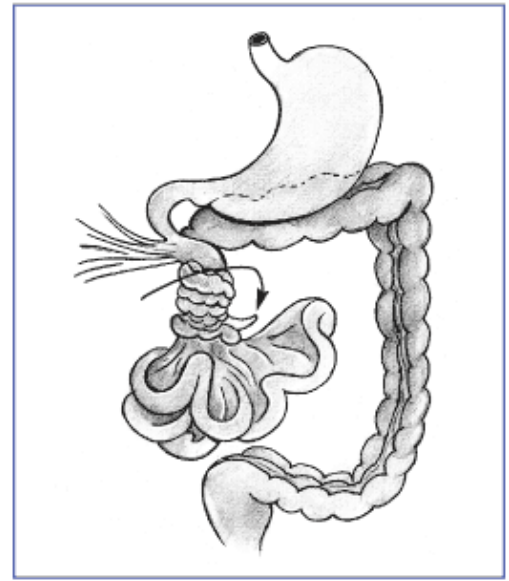
Malrotatie - inleiding



Malrotatie > Volvulus



>



Malrotatie - presentatie/diagnostiek

Buikpijn

Gallig braken

Uitgezet abdomen

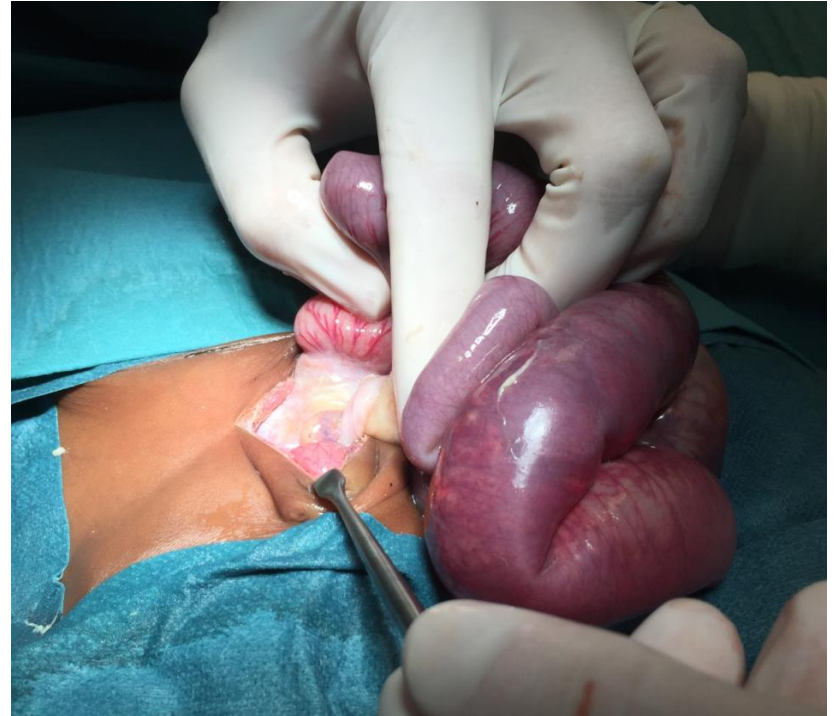
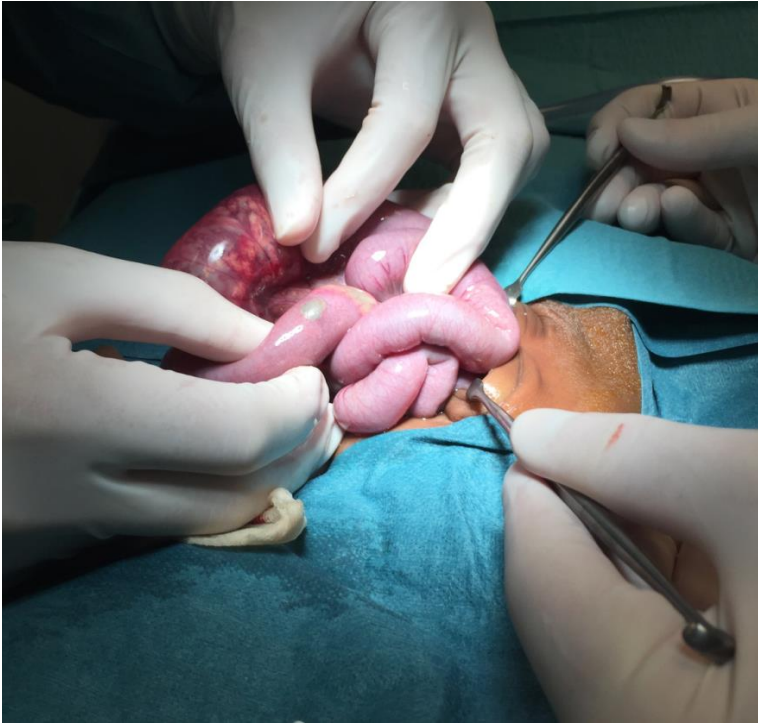
X-BOZ (dubbel bubbel)

X-inloop

Echo



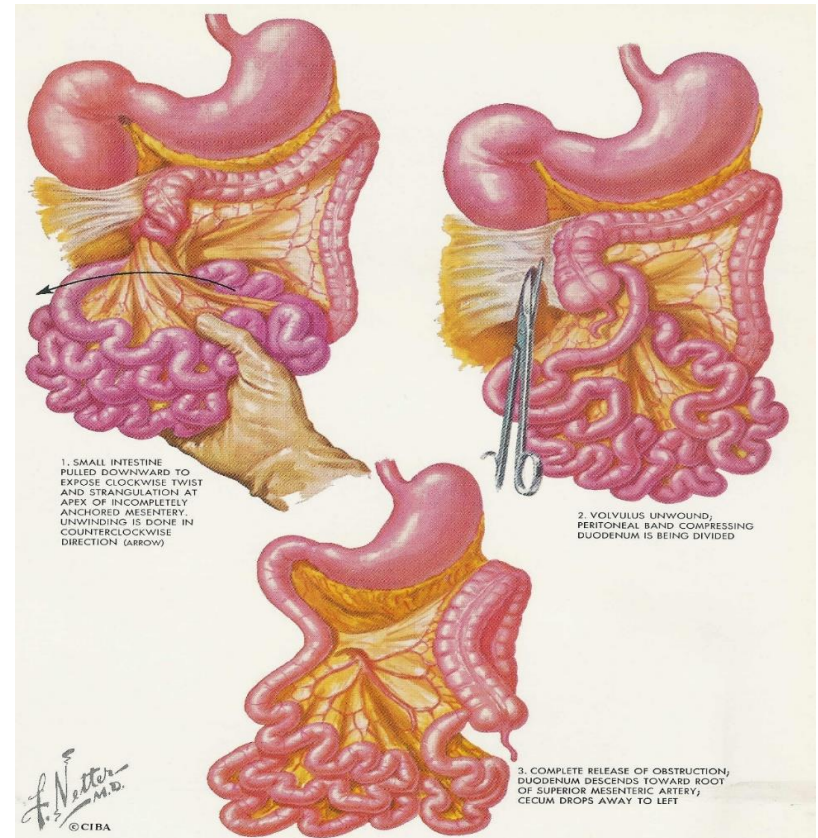
Volvulus

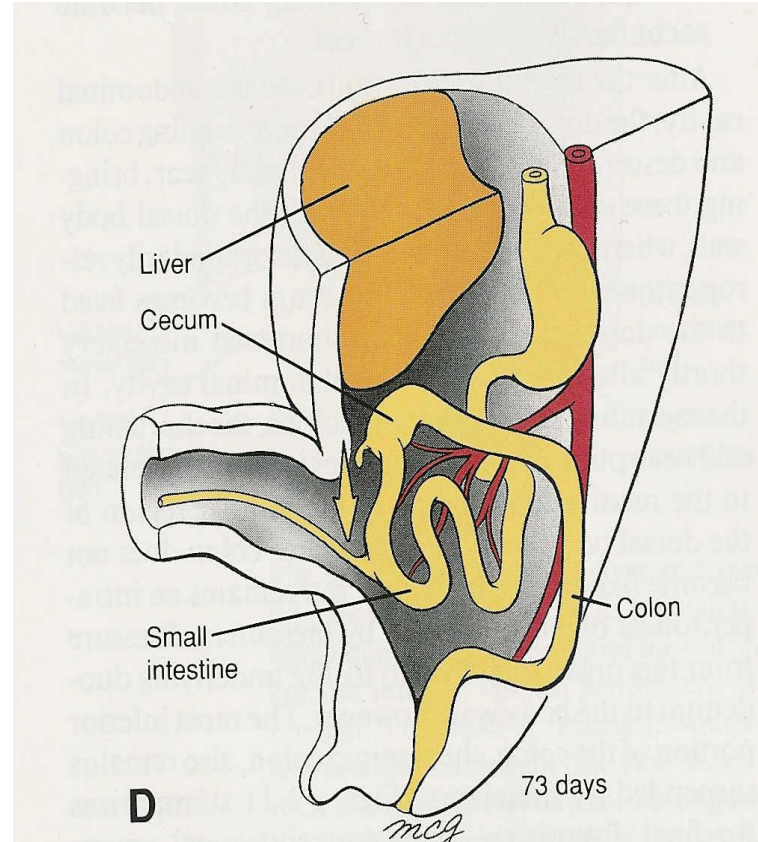
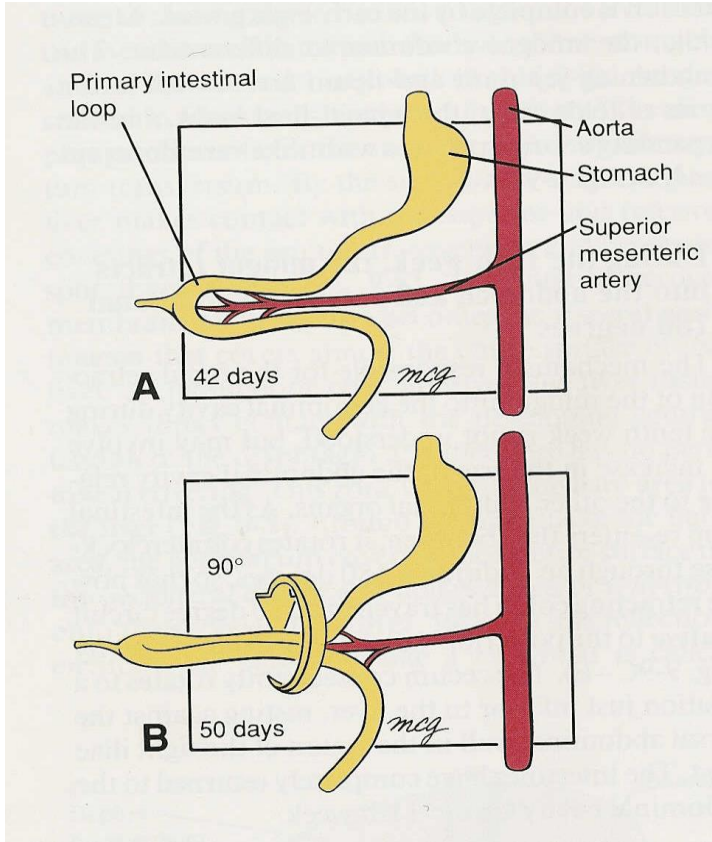


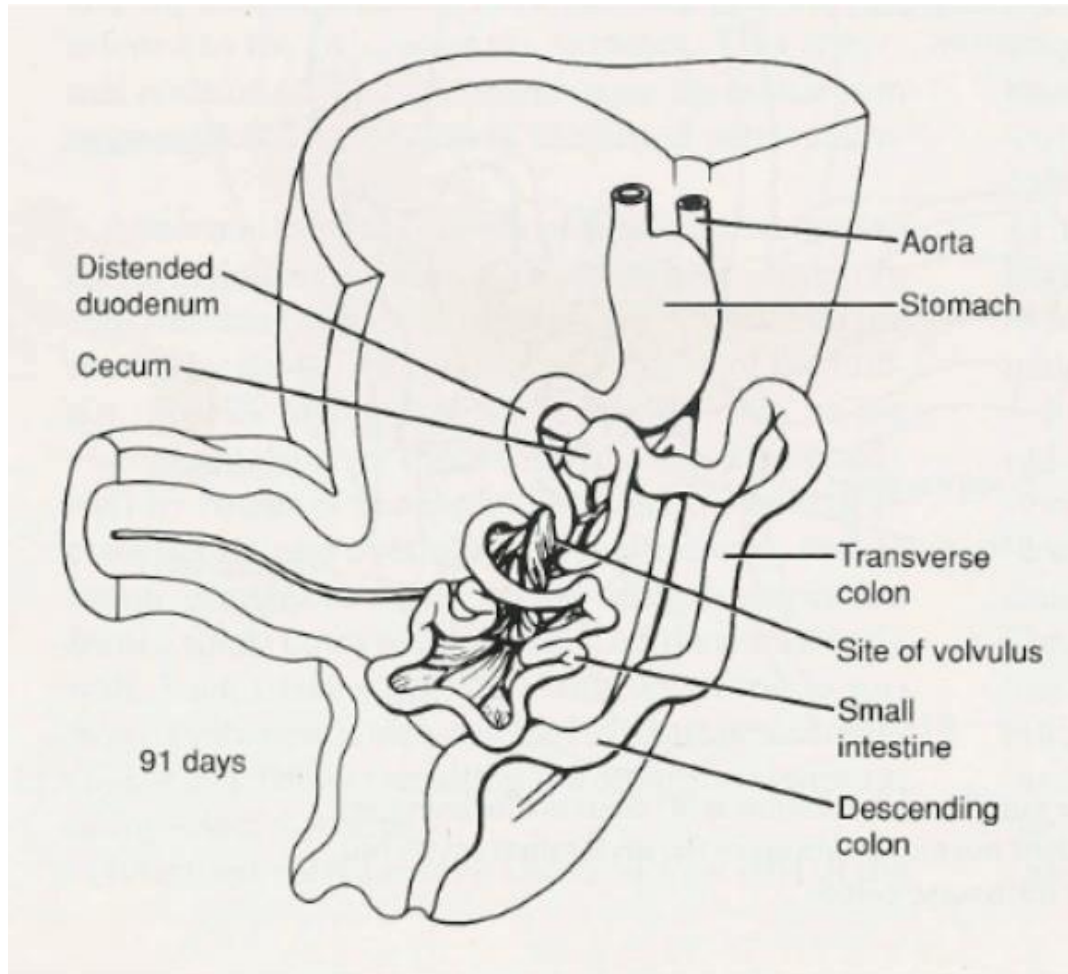
Malrotatie - behandeling

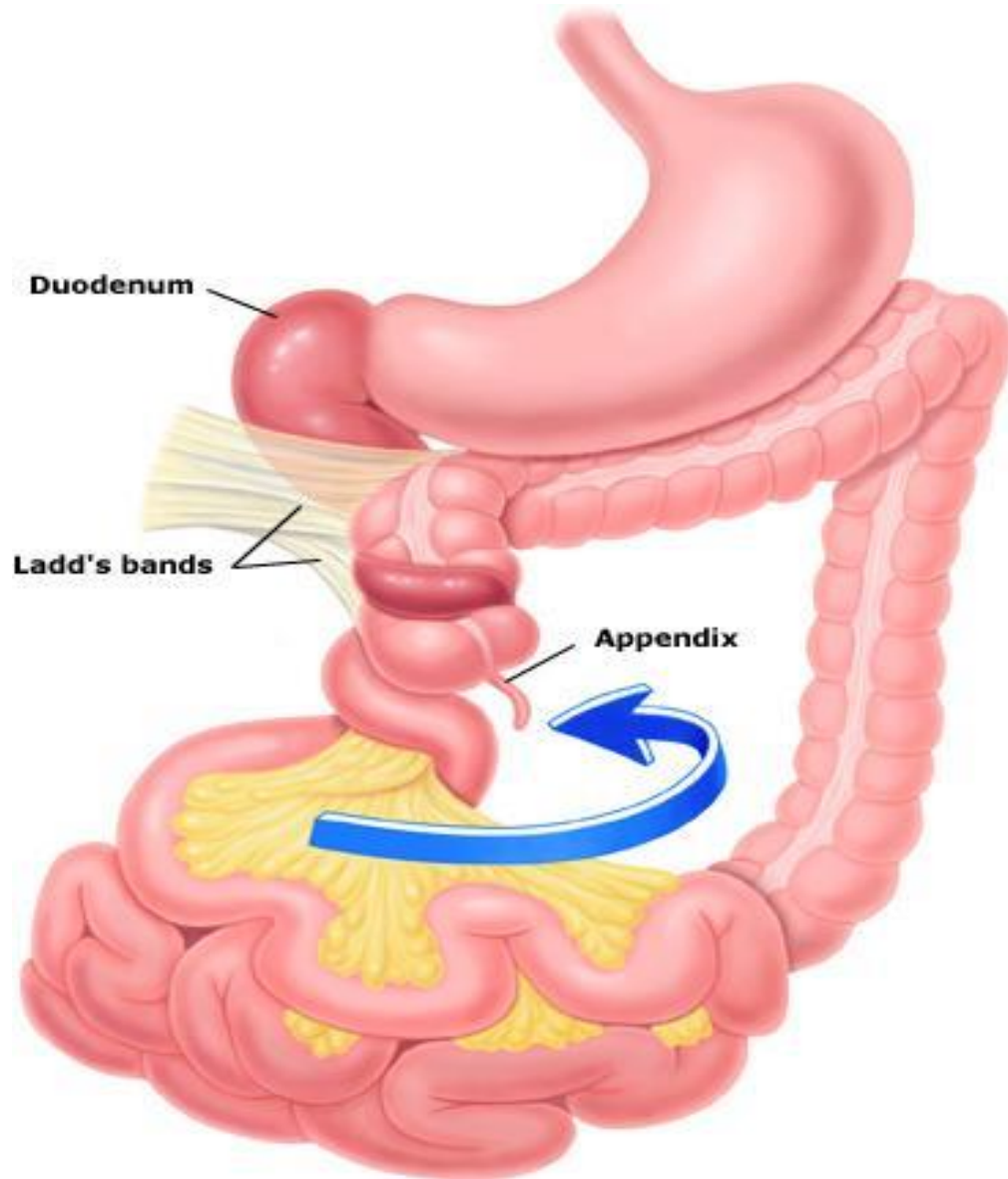
Laparotomie

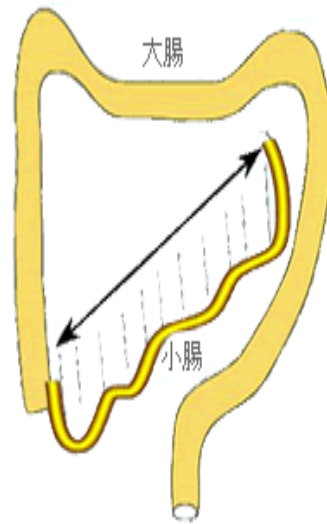
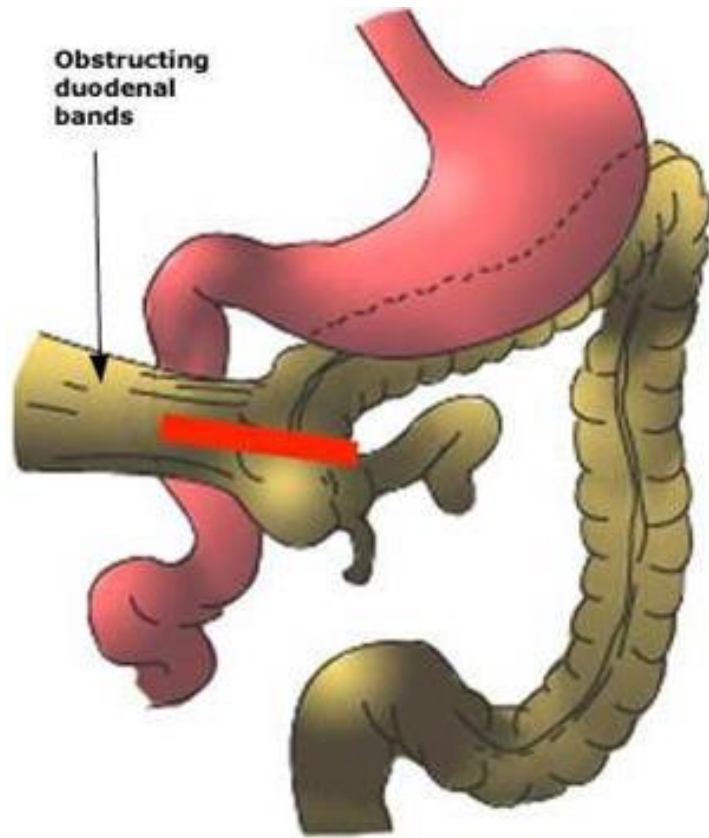
Laparoscopie

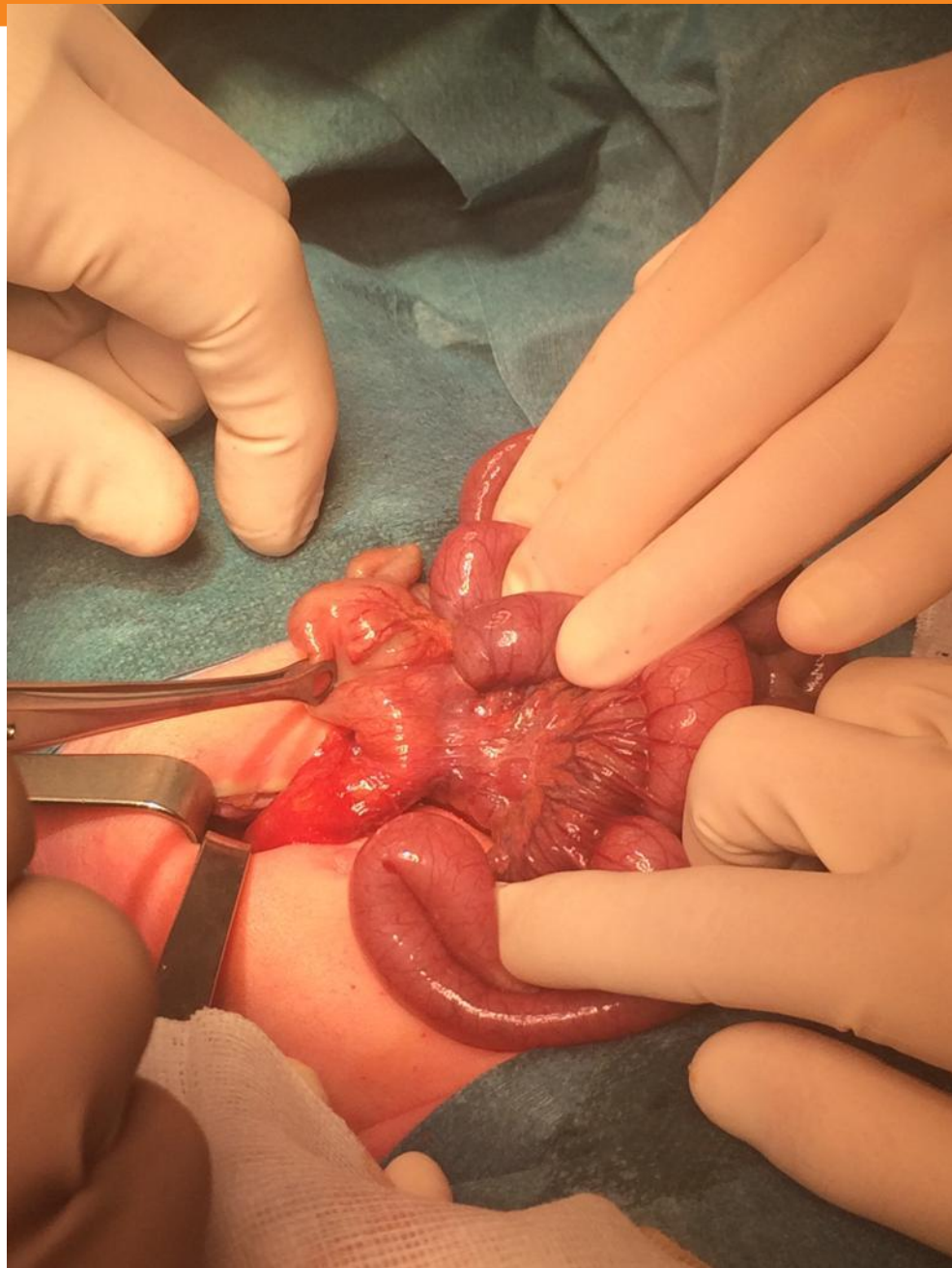














Postoperatief

- 2nd look?
- Opbouwen voeding, TPV
- Short bowel syndrome
- Geassocieerde problematiek
- Prematuriteit
- Goede uitleg aan ouders